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THE
OTTAWA NATURALIST,

Being VOL. XV of the

TRANSACTIONS

of the

OTTAWA FIELD-NATURALISTS' CLUB.

Organized March, 1879.

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1899.

THE OTTAWA FIELD-NATURALISTS' CLUB, 1899-1900.

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THE OTTAWA NATURALIST.

VOL. XIII.

OTTAWA, APRIL, 1899.

NO. 1.

ANNUAL REPORT OF THE OTTAWA FIELD NATURALISTS' CLUB, 1898-99.

The Council of the Ottawa Field Naturalists' Club herewith submits a summary of the work done by the Club during the year ending March 14th, 1899 :—

The number of members now on the roll is about 250 ; twenty have been added since our last annual meeting, and about the same number have resigned during the year. Thirteen council meetings were held. At the first meeting, leaders in the different branches were chosen, also an Editor and Associate Editors of THE OTTAWA NATURALIST.

The President, Prof. Prince, was appointed to represent the Club at the annual meeting of the Royal Society of Canada held in this city in May, when a synopsis of the Club's work was presented by him to that Society.

Early in the year the Council arranged for short excursions on Saturday afternoons, under competent leaders, to different places within easy reach of the city. The first was to Rockcliffe April, 16th. Those who attended spent a profitable afternoon. Early flowers were the chief attraction and eighteen different species were collected in bloom.

The second sub-excursion, to the Beaver Meadow, Hull, on April 23rd was attended by forty ladies and gentlemen.

The third was to Beechwood, April 30th, when between forty and fifty members and their friends were present.

The fourth was to Dow's Swamp, May 7th, when a small party made an interesting collection of plants.

The fifth to New Edinburgh, May 14th, was well attended.

At these excursions those desirous of gaining a knowledge of Natural History are brought into closest touch with nature

herself and are shown how they may most profitably pursue their studies. It is not the aim of the leaders to store the mind with scientific names of specimens or mere facts about them, but rather by suggestion to enable the students to find out facts for themselves, and thus become independent of teachers.

There were four general excursions. The first was on May 28th to Gilmour's Grove, Chelsea. It was attended by 175 members and their friends and was a complete success.

The second on June 25th to Chats Falls was largely attended and though the rather unfavorable weather prevented much work being done, all agreed that an enjoyable and profitable day was spent.

The third was to Aylmer, Sept. 24th, when a party of twenty-five attended. 75 species of Fungi were collected, and notwithstanding the lateness of the season twenty species of flowering plants were found.

The fourth and last excursion, Oct. 1st, to Chelsea was attended by about one hundred.

These general excursions are conducted in much the same way as the sub-excursions already described. The whole party however, usually assembles at some convenient spot an hour before leaving for home, when the leaders give short addresses on the salient features of the locality visited and the specimens collected.

During the winter the following papers and reports were read at the regular monthly soirées of the Club.

1898.

Dec. 14.—"Inaugural Address," by Prof. John Macoun, M.A., F.L.S.

"Notes on some Local Violets," by Mr. James M. Macoun.

Report of the Botanical Branch.

1899.

Jan. 10—"The Minerals of the Ottawa Valley," by R. W. Ells, LL.D., F.R.S.C.

"Notes on a herbivorous Dinosaur from the Cretaceous of Western Canada," by Mr. Lawrence M. Lambe, F.G.S.

Report of the Geological Branch.

Feb. 7—"Some Native Herbaceous Perennials worthy of cultivation," by Mr. W. T. Macoun.

"On the Burrowing Habits of *Cambarus*—the Cray-fish," by H. M. Ami, M.A., F.G.S.

"*Notes on Fresh-water Polyzoa*," by Mr. Walter S. Odell.

Report of the Ornithological Branch.

Feb. 21.—"*The Archeology of Lake Deschenes*," by Mr. T. W. E. Sowter.

"*Extra-limital Insects Found at Ottawa*," by Mr. W. H. Harrington.
F.R.S.C.

"*Notes on the rearing of a Young Cow-bird*," by Mr. A. G. Kingston.

Report of the Entomological Branch.

Mar. 7.—"*Life-history of the Salmon*," by Prof. E. E. Prince, B.A., F.L.S.

"*Natural History in Art*," by Prof. James Mavor, Toronto University.
(Both papers illustrated by lime-light views.)

Report of the Zoological Branch.

At each meeting, various interesting objects belonging to different departments of science were exhibited,

A most successful conversazione was held in the Assembly Hall of the Normal School, when the Club was honored by the presence of our noble patron His Excellency, the Governor-General. A full report of this meeting was published in the February number of THE OTTAWA NATURALIST.

THE OTTAWA NATURALIST under the editorship of Dr. Ami and seven Associate Editors has been issued monthly. The volume just completed, No. XII, is the largest we have issued. It contains 270 pages and 9 plates. These latter add materially to the value of the papers and are of exceptional merit. Five plates of Canadian Violets were drawn specially for THE OTTAWA NATURALIST, by Mr. Theodor Holm of Washington; Mr. Barlow's plates were from photographs taken by himself.

Many valuable papers have been published during the year. These cover the whole range of subjects included in the scope of the Club. In addition to these, numerous accounts of excursions and soirées, reports of the different branches, book reviews, etc., have been printed.

The special work done by members of the Club has been included in the reports of the various branches and need not be particularly referred to here as these reports have already been published or will appear in an early number of THE OTTAWA NATURALIST.

Shortly after the arrival in Ottawa of His Excellency, the Governor-General, a committee of your Council interviewed him

with a view of obtaining his patronage. He was graciously pleased to accede to their request and has since evinced great interest in the work of the Club.

A grant has again been received from the Provincial Government at Toronto. Upon this grant depends in great measure the maintenance of the standard of excellence which has made THE OTTAWA NATURALIST the best medium in Central Canada for the prompt publication of original papers bearing on the Natural History and resources of Ontario and the adjoining provinces.

The thanks of the Club are due to the Young Men's Christian Association, which kindly put the Association Hall at its disposal for the lectures; to Dr. J. A. MacCabe for the use of rooms in the Normal School for the monthly Council Meetings and for the library, also for the use of the large Assembly Hall for the Public Conversazione held on Jan. 24th; to the Electric Light Co. for their generosity in gratuitously putting in wires and lamps for the microscopes on that occasion; to the daily press for inserting notices of all meetings and thus helping the Club considerably by bringing its work before the public.

W. J. WILSON

Secretary:

EDWARD E. PRINCE

President.

TWENTIETH ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB.

The Twentieth Annual Meeting of the Ottawa Field-Naturalists' Club was held in the Lecture Hall of the Y.M.C.A., Ottawa, on Tuesday evening March 14th, 1899. The following members and officers of the Club were present; Prof. John Macoun, Dr. James Fletcher, W. H. Harrington, Colonel Wm. White, C.M.G., Dr. H. M. Ami, Dr. R. W. Ellis, Mr. R. B. Whyte, Mr. W. R. Billings, Mr. F. T. Shutt, Mr. D. B. Dowling, Mr. J. M. Macoun, Mr. Andrew Halkett, Mr. S. J. Jenkins, Mr. A. H.

Belliveau, Mr. A. B. Rowan-Legg, Mr. R. W. Brock, Mr. D. A. Campbell, Mr. J. Ballantyne, Mr. W. S. Odell, Capt. and Mrs. McElhinney, Miss A. Shenick, Miss Marion Whyte, Miss Kee, Mr. W. J. Wilson.

In the absence of Prof. E. E. Prince, the president of the Club, Prof. Macoun occupied the chair. The minutes of the Nineteenth Annual Meeting having been read and confirmed, the Secretary was then requested to read the "Report of the Council" for the year just ended.

Dr. James Fletcher presented the Treasurer's report which shewed that the Club was in a prosperous condition; all debts were paid and there was a balance on hand of \$65.00.

Mr. S. B. Sinclair's report as Librarian was then read by the Secretary, and on motion was received and adopted. Similar resolutions were passed regarding the Report of Council and Treasurer's statement.

The Chair announced that the Librarian had prepared *thirty-two* complete sets of the *Transactions of the Ottawa Field-Naturalists' Club* including Vol. I—XII of THE OTTAWA NATURALIST, and that these could only be sold in complete sets.

Dr. Ami presented a verbal report of the Editorial Staff of THE OTTAWA NATURALIST and stated that Vol. XII just completed, contained the largest number of original papers published in any one year by the Club, and that he had still on hand a number of very valuable manuscripts for the in-coming Editor.

Mr. R. B. Whyte spoke on Nova Scotia Bird-lists; Mr. Kingston, on reports of meetings and soirées for the press; Mr. Shutt, on the advisability of having a paid officer to assist the Secretary, Treasurer and Editor, in the clerical work of the Club; Dr. Ells and Mr. Kingston on responsibility of leaders. It was pointed out further that when leaders were appointed and held office—they were expected not only to prepare but also sign the reports presented to the Council and Club.

The Club then proceeded to the election of officers. The names of the new officers appear on the cover of this number of THE OTTAWA NATURALIST.

TREASURER'S REPORT FOR THE YEAR 1898-99.

To the President and Members of the Ottawa Field-Naturalists' Club :

The Treasurer begs to report that although the finances of the Club are in a satisfactory condition, as far as the balance is concerned, they are in a very unsatisfactory state with regard to the payment of subscriptions by members at the time they are due. By an expenditure of much time and labour, a large amount has been collected for arrears ; but the payments on account of the current year's subscriptions are not at all what they ought to be. The Treasurer makes an earnest appeal to the members to pay in their subscriptions at the beginning of the Club year instead of waiting until the end. The printers must be paid month by month, and were all fees paid when due, the Council could carry out much good work which has to be left undone, owing to uncertainty as to when funds will be available. Further, owing to neglect on the part of members to pay their fees unsolicited, the Club is put to much extra expense for postage, and the work of the Treasurer is much more than doubled.

Another matter which the Treasurer considers it his duty to again bring prominently before the members of the Club, is the patronage of those firms who help the Club by advertising in the OTTAWA NATURALIST. These are all first-class houses who will supply goods at least equal in quality to those to be obtained anywhere else, and it is only reasonable that they should expect to receive an increase of business from the members of the Club, whose interests they serve by advertising in the Club organ.

Your obedient servant,

JAMES FLETCHER

Treasurer.

OTTAWA FIELD-NATURALISTS' CLUB.

Treasurer's Statement for the Year Ending March 14th, 1899.

1898.	RECEIPTS.	EXPENDITURE.	
Mar. 11. Balance.....	\$ 69 90	Printing OTTAWA NATURALIST, including wrapping and postage, December 1897 to March 1899, (16 numbers).....	394 32
Subscriptions 1898-9.....	\$114	Less discount	17 47
Arrears	139		
	<hr/> 253		
Government grant.....	200		
OTTAWA NATURALISTS sold	1 63		
Authors' extras sold.....	18 75		
Electrotype sold.....	50		
Excursion profits.....	8 00	Illustrations	376 85
Advertisements	62 1c		60 45
			<hr/> 437 30
		Printing Authors' extras	37 05
			<hr/> 474 35
		Miscellaneous printing	30 90
		Expenses of Conversazione	24 70
		Advertising.....	1 60
		Stationery	2 82
		Postage	12 18
		Balance	67 33
	<hr/> \$613 88		<hr/> \$ 613 88

Audited and found correct

J. BALLANTYNE, } *Auditors.*
R. B. WHYTE, }

JAMES FLETCHER,
Treasurer.

March 28, 1899.

PROCEEDINGS OF THE NATURAL HISTORY
ASSOCIATION OF MIRAMICHI.

The formation of a Natural History Society at Miramichi is another evidence of the fresh interest that is being taken in the Maritime Provinces in all branches of Natural History. The papers of greatest interest to Ottawa Naturalists in the first number of the Proceedings of the Association are: "The Anowra of New Brunswick," by Philip Cox Ph. D, "Our Winter Birds," by J. McGregor Baxter, M. D., and "The Moths of Miramichi," by J. D. B. F. MacKenzie.

THE MINERAL RESOURCES OF THE
OTTAWA DISTRICT.*

By R. W. ELLS, LL.D., F.R.S.C.

In investigating the mineral wealth of any district, in order to proceed on a right basis, one should, first of all, carefully consider the geological conditions which prevail, and should ascertain, by a careful preliminary examination, whether such conditions are favorable for the occurrence, or otherwise, of mineral deposits, in quantity to be economically important. If this precaution is neglected there is often a very great possibility that large sums of money may be foolishly squandered in a vain search after the impossible.

In all such investigations it may safely be regarded as an established fact, that our mineral deposits are determined by certain active causes. The action of these causes and their influence upon the associated rock masses, it is largely the business of the geologist, mineralogist or mining engineer to investigate. Unfortunately in the history of mining in this country, as well as elsewhere, this principle has often been entirely disregarded. In the course of some twenty-five years wandering to and fro, in the service of the Geological Survey, it has been my fortune to encounter many such cases, and to witness the small savings of individuals, singly, or even the capital of large companies, wasted in a vain attempt to obtain from the bosom of old mother earth some small share of her buried treasures, simply because some person, often with a smattering only of a few scientific terms, but who was otherwise entirely lacking in all knowledge of the conditions which govern mineral deposits, had asserted that the conditions in certain localities were favorable to the attainment of mineral wealth.

Very often it is to be feared that such statements are made by the adventurer, simply on the chance of getting money easily from the inexperienced, and in such cases, the poor proprietor, after investing what money he could raise, has had his dearly bought experience for his trouble, with possibly the addition of

*Read by title before the Ottawa Field-Naturalists Club, Jan. 10th, 1899.

a fine large mortgage on his property, which probably he may never be able to lift. One need not go far from the province of Ontario for illustrations of this peculiar tendency on the part of certain persons to invest money in this reckless manner. Thus when we find men, otherwise shrewd enough in ordinary business matters throwing away thousands of dollars in an attempt to obtain oil by boring through the Laurentian granites and gneisses as has been done in the upper Rideau district not very long ago, even by people who should have known better, there is evidently a necessity for further enlightenment on these subjects, in order that the public may be better guided. Recently, I met a person who was endeavouring to obtain coal by sinking a shaft through the crystalline limestone in Lanark county, and in reply to my observations that he would not find it there, he stated that he knew he did not agree with the scientists on the subject, but he was convinced the coal was there, because he had smelled the gas in the shaft. His case was a hard one and difficult to deal with, for the reason that he would not be convinced on the ground of common sense and scientific knowledge; and his chances for success were scarcely equal to those of a man I once met in New Brunswick, who had a large farm composed principally of barren grey sandstone, but who knew that there was a large body of iron ore on his place because lightning had struck there twice in fifteen years.

It is wonderful how some men get carried away on the subject of mines. I have known men of the highest standing in the legal world who were prepared to spend thousands of dollars in mining on the word of a travelling clairvoyant, whom they had consulted on the subject, and who, after going into a trance, declared he clearly saw a large body of rich ore three hundred feet below the surface. On the mere strength of such a statement a company went to work and sunk a shaft 500 feet, in which they dropped 50,000 dollars of capital, without finding the rich ore body so easily located. People in general will scarcely believe such instances of folly exist among those whom education should cause to know better, but at the same time

almost similar instances could be cited from many localities, did time permit.

If, however, we were to go on and relate many such cases, there would be but little time for the matter proper of this paper, and I will pass from the consideration of this subject by saying that with many men who become infected with the mining fever, so peculiar is their disposition, that in many cases the advice of a competent mining or geological expert is very apt to be disregarded, most people preferring probably to cure themselves of the disease in their own peculiar way.

With regard to the leading geological features of the mineral bearing areas of the Ottawa District it may be said that these are referable to two divisions of rocks, viz., the Palæozoic and the crystalline. Concerning the origin of the rocks of the former there is no great doubt. They are sedimentary, and contain in their mass the traces of organisms peculiar to the age in which they were deposited. All these fossiliferous deposits have been arranged in due order like the pages of a great book, by turning which a clear and comprehensive history of the growth and development of the earth's crust, for this portion of its history, can be obtained.

When we come to the question of the underlying crystalline rocks we have a different story. Formerly these were regarded by many as having originally the same origin as the newer rocks, that is, the greater part were also held to be sedimentary deposits. Recent studies, both in the field and in the laboratory, have however led to a marked change of opinion in this respect, and it is now very clearly established, that a very large proportion of the crystalline rocks have been produced without the agency of water in the ordinary sense, but are distinctly and directly igneous in their character. In this way we have come to regard many of the rock masses, with which our most important minerals are associated, as intrusive through the sedimentary deposits, and this peculiarity of intrusion has in many cases, had a very important bearing upon the development of the associated minerals.

The principal rocks of the crystalline series, which in Canada have been, for the most part, long regarded as

Laurentian or Huronian, and over the origin and relations of which many wordy battles have been waged, consist of granite, gneiss, limestone, greenstones, &c. The term gneiss does not apply of necessity to rocks of any special age, but has a general reference to structure only, though this distinction has often been lost sight of in discussions on the subject. A gneiss has been by some regarded as peculiar to the rocks of the Laurentian system, yet when we find a granite of comparatively recent age, as is the case of many of the masses which penetrate the sedimentary formations as recent as the Cretaceous, assuming a foliated structure, especially on the outer zone, a feature which may be due to pressure or other causes, it is also styled a gneiss, as readily as is its older brother of the Laurentian time.

The generally accepted idea at the present day, as to the structure and relations of these oldest rocks of our country may be briefly stated, as these points have a manifest bearing on the question of mineral deposits. The lowest, and presumably the oldest, since upon these all the others rest, is a reddish, or greyish granite gneiss but containing different coloured bands, and called for the purpose of distinction, the lower or sometimes the Ottawa gneiss. This rock may be held to represent the oldest known crust of the earth, though probably now in a form much modified or altered from its original condition, when this crust was first consolidated. It is, in so far as yet known, lacking in mineral deposits of economic importance.

Succeeding this in ascending order, are certain other gneisses of greyish or darker shades, some of which have been clearly shewn to owe their origin to aqueous action, though now in a highly metamorphic state. With these are associated bands of quartzite and limestone which sometimes form large areas. These last, with the upper gneisses, form what has been styled the Grenville and Hastings series of the Ottawa district. We thus have in the crystalline rocks produced in two different ways.

Throughout the districts in which these rocks occur there are often great masses of granite, anorthosite, diorite and pyroxenic rocks, some of which also shew a gneissic structure ;

but as a rule these are of more recent date than the limestone and gneiss with which they are associated; and it is in connection with these later intrusive masses that, in our search for economic minerals, we are particularly interested, since in some of these our most important deposits occur, among which may be mentioned the several ores of iron, the gold of Hastings and the nickel of Sudbury.

The determination of these areas is therefore very important from the economic standpoint, and much time and study has been, and is still being, devoted to the study of this group of rocks by the officers of the Geological Survey. In connection with the upper gneisses also, or rather with the intrusive masses of pyroxenic rocks associated with these, are the great deposits of apatite, mica, &c. found both to the north and south of the Ottawa River. The asbestos of this district is associated with serpentines and generally with the crystalline limestone, and were it not for the enormous deposits found in the Eastern townships of Quebec, the occurrence of this mineral would be of much greater importance than is now the case.

For though mineral deposits may theoretically have the same value at different places and times, this value does not always hold in practice. Thus the apatite deposits which were at one time extensively mined and of great economic importance, have, since the development of the more easily obtained phosphates of the Southern States, become practically valueless, since they cannot now be mined at a figure to enable them to enter into successful competition with the cheaper output of the south. A somewhat similar case is afforded in the micas, though here the results are not so disastrous to the persons engaged in the industry. At one time the price of this material was governed, to a certain extent, by the size and colour of the crystals obtained, but the market value of the mineral, in regard to the largest sizes, has now greatly diminished, owing to the discovery of a process by which sheets of almost any required size can now be built up from small pieces, by a process of interlamination, cementing and pressure, so that the high prices once obtainable for large crystals cannot at present be realized,

and the profits from its mining are proportionately reduced.

In connection with the flat-lying deposits of the Palæozoic formations important mineral deposits are rarely found in this part of our country, with the exception of certain areas of Bog-iron ore, such as are seen near Vaudreuil; but the limestones and sandstones from the Potsdam to the Trenton furnish abundant supplies of building stones often of quite as much importance as sources of revenue as are the mineral deposits of the older crystalline rocks.

Before taking up the question of the distribution of the ore deposits in the older rocks it may not be out of place to say a few words in reference to the development of a new industry which in some localities has already been entered upon with good prospects of remunerative returns. Unfortunately for this at the present day, the glamour which surrounds our mining areas in the west tends to draw away attention from possible fields for profitable investment nearer home. I refer to the utilization of our peat bogs, which form a conspicuous feature over many miles of our generally level country between the Ottawa and the St. Lawrence. As much as thirty years ago the question of utilizing these peat bogs was brought prominently forward in the country east of the St. Lawrence, and a large quantity of the material was extracted and prepared for fuel, principally for use on the Grand Trunk railway. The operations in this direction were carried on at three principal points, viz., 1st., on the line of the Three Rivers branch railway, 2nd., in the great bog lying between the city of St. Johns and Farnham, and 3rd., on the St. Lawrence River, near the village of Port Louis, in the county of Huntingdon. A good demand arose for the fuel and tests made by the Grand Trunk railway were apparently satisfactory to the company, who were quite prepared to adopt it for the work of their road. The great objection however to its use at the time was its bulky nature, and the industry, which at one time promised to assume great proportions, was allowed to dwindle away. Recent experiments have, however, shewed that, by a proper system of compression, a really excellent fuel can be made, having a density nearly equal to that of

ordinary coal, while in calorific power the tests already made have shewn it to be quite as valuable as that substance. While, however, the experimental stages have been quite satisfactory, it was found that in the manufacture, through some defect in the machinery, its commercial output has hitherto, not been such as to contribute largely to our mineral wealth. From the satisfactory nature of the work done lately however it may be taken as assured that the commercial aspect of this question will be shortly settled and a compressed peat, which will replace coal for all purposes, both in our houses and factories, as well as on many of our lines of railway, will yet be an accomplished fact, especially in view of the statement of those who have already engaged in the work, that such a fuel can be produced at a cost, at least half of that which we now pay for coal. This material has for years been successfully produced in Germany, where the industry of compressed peat has assumed large proportions and where a most excellent fuel is prepared at a cost of less than two dollars per ton.

But there is also another aspect of the question which is already receiving much attention by the persons interested in the exploitation of our peat deposits. For a number of years there has been sent to the markets of the leading American cities a substance known as moss-litter, which finds a ready sale at remunerative rates, and for which there is an ever increasing demand. This industry is now being carried on in the Welland district where the peat bogs along the line of the canal are being utilized.

In practice the working of a peat bog should embrace both the preparation of the moss-litter and the manufacture of compressed peat. The substance of a good peat bog is divisible into three portions or strata, viz., the upper or green growing surface, of which but little use can be made and which must first be removed in order to reach the lower and economically available portions.

This second part has a thickness of three to four feet, and passes gradually downward into the black and unctuous portion which is best suited for fuel purposes. In the economic working of a peat bog therefore, due attention must be paid to this order

of succession, and it was doubtless to a lack of this separation, that much of the failure experienced in the attempt to obtain a first rate fuel in the early days of the industry can be attributed.

In the preparation of the litter after the living green surface with its tangled mass of shrubs has been taken off, the next three feet or so is removed, teased out and dried in the sun or by the application of artificial heat, then carefully baled and is ready for the market. The price of this varies from five to ten dollars per ton, and it is now used in all the largest and best conducted stables in the principal cities in England and in the United States. The great merits of the material for this purpose are that, in the first place it is a wonderful absorbent of all the liquid matters found in the stable, a perfect deodorizer, cleanly, and when it has served its purpose in this capacity provides a large quantity of a most excellent fertilizer for the farm, for which it also is in great demand. As there are in the country between the Ottawa and the St. Lawrence several important areas of this raw material, as well as on the east of the latter river, we have at our very doors an almost inexhaustible supply of mineral wealth, which at no very distant day, will doubtless be largely utilized, that is, after our people have become alive to the fact that there is money in its exploitation. Then when the bogs have been carefully drained and the machinery for the proper compression of the rich underlying peat has been perfected, or introduced after the model of the German machines, which should only be a matter of time and experiment, there is no apparent reason why the fuel supply of eastern Canada should not be supplied from these home localities. What that means, in view of the great extension of our railway systems and the constantly increasing demand for coal for domestic consumption and for our factories, is very clear to any enquiring mind, so that though it is true that all is not gold that glitters, it is equally true that there is gold in certain substances that do not glitter at all. It is interesting to know that within the last few months there have been many enquiries as to the extent and location of these deposits, and there is evidently a growing intention to utilize their hidden stores of wealth.

(To be continued.)

REPORT OF THE LIBRARIAN

During the year numerous exchanges and other publications have been received and placed in proper position. Thirty two complete sets of back numbers of "THE NATURALIST" from the time of its inception, 1879, to the present time have been arranged and stored in a cupboard easy of access. This exhausts all copies of certain months but leaves a large number of copies of other months. By this arrangement considerable new space will be secured in the Library room.

For a number of years no apportionment has been made for the binding of publications. I beg to suggest that it would be wise to revive this custom as regards the most valuable exchanges. It might also be well in view of the limited number of back copies of "THE NATURALIST" to formulate a more careful plan of distribution than in the past.

All of which is respectfully submitted.

S. B. SINCLAIR.

Ottawa, Mar. 14th, 1899.

Librarian.

BOTANICAL NOTES.

Edited by DR. JAS. FLETCHER.

GENTIANA SERRATA.--In the autumn of 1897 several specimens of this interesting plant were found and identified by Miss Mary Nagle, teacher of School Section No. 6, Huntley, to whom belongs the credit of being first to locate the plant in the Ottawa district.

While travelling from Stittsville toward Ashton on Sept. 14th, 1898, the writer discovered a colony of many hundred specimens growing near the roadside in wet sandy soil, a congenial habitat for this plant. The rich blue and the ciliate fringed margins of the corolla render the "fringed gentian" one of the loveliest of our native plants.

VERBASCUM BLATTARIA.—In the summer of 1891 a small colony of Moth Mullein was noted in an old pasture on Lot 33, Ottawa Front about half a mile west of Mechanicsville. Though

this locality has been visited regularly every summer the above-mentioned plant has not been observed since 1891 until last summer when several sturdy colonies, some of them hundreds of yards apart, were found in an excellent state of bloom. The flowers were the pale yellow variety with purple markings. The best specimens were about four feet high.

INTRODUCED PLANTS. Three plants evidently introduced from the North West, *Helianthus rigidus*, *Lepachys columnaris*, and *Grindelia squarrosa*, were reported by the Botanical Section in 1891, as having been found near the old Eddy Mill-sight at Birchton. Only the last of the three appears to have persisted. Since 1891 *Grindelia squarrosa* has spread over a considerable area. The bright yellow flowers and a profuse resinous, viscid coating are conspicuous features of this thrifty plant.

ARALIA QUINQUEFOLIA.—On October 7th, 1898, several fine plants of this species were obtained near an old roadway on the Chats Island, but in all cases the fruit had already disappeared. In the Autumn of 1897 a party of Indians sold about sixteen pounds of the roots of this Ginseng in Fitzroy Harbor. They stated that they obtained a considerable quantity of them on the Chats Island.—R. H. COWLEY.

VIOLA CUCULLATA.—Our knowledge of the local distribution of the six species of the *V. cucullata* group enumerated in the January number of THE OTTAWA NATURALIST is yet far from complete. The admirable illustrations, which were published at the same time, will enable the youngest amateur botanist to determine the several species providing care be taken to collect flowers and summer fruit from the same locality, and so carefully as to preclude the possibility of mistakes. Three of the species are known from but one locality while the other three are of more general distribution.—J. M. M.

SPRING ANNOUNCEMENT.

The Council of the Club has arranged a series of seven afternoon lectures for the spring weeks. These lectures will be of an elementary character and are designed to excite a wider interest in popular science. They will be delivered in one of the Normal School lecture rooms at 4.15 p. m. on Mondays as follows :

April 10th—Geology, Dr. H. M. Ami ; April 17th—Botany, Mr. R. B. Whyte ; April 24th—Entomology, Dr. Jas. Fletcher ; May 1st—Conchology, Mr. F. R. Latchford ; May 8th—Ornithology, Mr. A. G. Kingston ; May 15th—Zoology, Prof. John Macoun and Mr. W. S. Odell ; May 22nd—Planting and care of Forest Trees, Sir Henri Joly de Lotbinière.

Members of the Club are requested to bring these lectures to the notice of their friends.

SUB-EXCURSIONS.

Sub-excursions will this season be made a special feature of the Club's work. The attendance of leaders in each of the principal departments of natural science is assured and the student can find no better means of acquiring knowledge than these sub-excursions. These first visits to the woods are a perennial pleasure to the older members of the Club and this notice is especially intended for those who usually restrict their attendance to the general excursions.

Those who attend the sub-excursions will rendezvous at 3 p.m. at the point on the Electric railway nearest to the locality chosen for investigation. The April excursions will be :—

April 15, Rockcliffe ; April 23, Hull ; April 30, Beechwood.

OTTAWA HORTICULTURAL SOCIETY.

The Horticultural Society is this year offering an exceptionally fine lot of premiums of which members may select ten upon payment of the small annual fee of \$1.00.

The usual monthly meetings will be held during the year, when in addition to the exhibits of seasonable flowers, addresses will be delivered by leading Horticulturists. Nearly \$400.00 in prizes will be offered for all of which members may compete. In order to obtain the premiums subscriptions must be sent to the Secretary by April 15th. Address Mr. J. F. Watson, Experimental Farm.

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THE MINERAL RESOURCES OF THE OTTAWA DISTRICT.

By R. W. ELLS, LL.D., F.R.S.C.

(Continued from April number.)

While mineral developments are found throughout the Ottawa valley at a number of places, there are two localities in the lower Ottawa basin which have for many years been distinguished for economic production. Of these, probably the most important, as to output, are the deposits of apatite and mica lying to the north of the Ottawa River and, between the rivers Gatineau and Lièvre; the other is situated to the south, in the vicinity of the Rideau lakes, and near the line of the Kingston and Pembroke railway, in which districts our great deposits of iron are located. In the great area occupied by the lower or Laurentian gneiss the mineral developments are, in so far as yet known, few, and it may be generally remarked that investigations along these lines in that area have not yet been very successful. The geological horizons therefore, in the crystalline rocks that promise the best results, and have so far been the most productive, are the upper part of the gneiss and limestone formation and the associated Huronian rocks.

Now if we carefully study the rock masses in these areas we find a very extensive development of clearly igneous rocks, such as greenstones, granites, pyroxenes, diorites, &c., and it is generally in connection with some of these masses that our most productive mineral deposits may be looked for. The natural inference therefore is that mineral developments are in some way due to the agency of these latter intrusions.

That many of these intrusive masses are newer than the rocks with which they are associated is clearly shown by the fact that, though they sometimes occur as apparently bedded portions, they quite as often occur cutting the surrounding

strata at all angles. It was to some extent, doubtless, this bedded character that led to the original supposition that these masses were, for the most part, sedimentary in their nature, and this was the view expressed by most writers on this subject twenty to thirty years ago.

APATITE.

If we examine any of the mines of apatite, either to the north or south of the Ottawa, we find this mineral invariably associated with pyroxene, which would therefore appear to be its necessary accompaniment. Now the pyroxene dyke or mass which cuts across the strike of the gneiss or limestone must be of more recent date, and the apatite is generally found along the outer margin or near the lines of contact of the intrusive mass and the gneiss. Frequently, however, masses of calcite, often of large size, and of a pinkish or grey color, are found in the mass of the pyroxene, and this frequently contains large crystals of both apatite and mica, leading to the statement by some observers that these minerals occur sometimes in economic quantity in the crystalline limestones. One must however discriminate between masses of calcite which are an integral portion of the pyroxene dykes, and the limestone formation proper, which is an entirely different thing, so that it may be safely stated as the result of the examination of all the known mines of this mineral, that apatite is not found except in association with pyroxene.

As to the origin of this mineral opinions differ, but it is found generally in one of two ways, either as large pockety masses, which sometimes yield a thousand tons or more, or as irregular developments varying in width from a few inches to several feet in thickness. The extent and value of this one of our mineral resources of the Ottawa district, may be gathered from the statistics contained in the official bulletins of the Geological Survey. Thus we find that, in the seventeen years from 1878 to 1894, the output of this mineral from the mines of eastern Ontario was 24,760 tons, with a market value of 260,974

dollars, while from the mines of Quebec the output for the same time was 269,771 tons with a value of 4,749,888 dollars, so that the total product of the phosphate mines of the lower Ottawa district, for this period, was not far from 5,000,000 dollars, which, it must be allowed, is a very creditable sum and only one and a-half million dollars less than the total gold output from all the mines in Nova Scotia in the same time. The placing on the English market, about 1890, of the cheaply mined phosphates of the Southern States, which could be put on ship-board at a cost of about two dollars per ton, caused a speedy decline in the market for the high-priced Canadian apatite, so much so that within the last three years the last of these mines has been obliged to discontinue working entirely, and this great source of mineral wealth is now at an end, and will probably not be again utilized until the exhaustion of the southern deposits has been reached. In mineral development, therefore, we see that progress and profit are simply a matter of supply and demand. In both Ontario and Quebec there are yet great stores of apatite which may some day again find a market, and then we can look to a return of prosperous conditions in this part of our valley and the utilization of some of the large amounts of capital invested in this direction.

MICA.

Closely allied to apatite in its associations, and to some extent also in its mode of occurrence, are the deposits of mica. The demand for this mineral has, however, never been so great as in the case of the other, while the industry has not been prosecuted for so long a time. yet from the mica mines of the Ottawa district there was marketed in the nine years from 1886 to 1894, a total value of half a million dollars. The occurrence of mica forms an interesting subject of study, and some facts have been obtained, from a close inspection of many localities, that may be of general interest. Merchantable micas are of two or three varieties, principally muscovite and phlogopite, with the variety biotite. The first is known as a potash mica, the

others as magnesian micas, of which the biotite differs in containing iron as well, and is consequently darker in colour and sometimes quite black. The muscovite is distinguished by its general clearness and lack of colouring, while the phlogopite mica is usually some shade of brown or yellow and is generally known as amber mica. Years ago large sheets of white mica, as it was generally styled as contrasted with the darker coloured or amber variety, were quoted at a very high price, but this distinction seems of late years to have largely disappeared, as is also the case with sheets of extra large size, since this feature of size is now attained by a process already referred to of building up by means of cement and pressure from smaller sizes, so that almost any size required can now be readily obtained.

Of these several varieties, the white or muscovite is usually found in association with intrusive masses of a whitish granite, composed of quartz and white felspar which cuts the gneiss and limestone in the form of dykes or veins; while the amber and black varieties are found in connection with pyroxenes. As a rule the darker the containing rock the blacker the mica, so that in the light coloured pyroxenes the mica is often a light shade of amber. The most perfectly shaped crystals are generally found in a matrix of calcite in the pyroxene; and were it possible to secure perfect crystals at all times there would be much more profit in mica mining than has yet been enjoyed. Unfortunately, however, the greater portion of the crystals are injured by wrinkles, cracks, small punctures or from some other cause, so that it is a fortunate mine that will yield ten per cent. of merchantable mica from its total output.

Crystals are often found in the Gatineau district of very large size, one from a mine near the Cascades being stated to have a diameter of nearly eight feet. Unfortunately these large crystals, owing to their generally fractured condition, have generally but little economic value. One of the largest deposits of this mineral yet found in the Gatineau district is in the township of Hincks. It occurs in a dyke of pyroxene which cuts the limestone of that area and is in turn cut by a dyke of green-

stone. The crystals here were of a large size, sometimes as much as three feet across, and many of them so clear that plates two and three feet long by nearly a foot in breadth were obtained. The mica here was dark coloured as might be expected from the dark colour of the containing rock, and a large quantity of excellent mica was extracted before the deposit was exhausted.

A very pretty purple-tinted mica is also sometimes found in cases where a dyke of light-tinted granite cuts the limestone, but as yet has not been obtained in quantities to be of economic value.

IRON ORES.

The iron ores of this district are divisible into several classes and occur at several horizons. The principal workable deposits are magnetites, though several mines have been opened on hematite ores, and sometimes both varieties are associated, as in the case of the Haycock mine and at several points in Renfrew county. Of the magnetic variety there are also two kinds, viz., the titaniferous and the true magnetites, and each of these is found in its peculiar country rock. Thus in the case of the titanium ores it may be said that they usually occur in anorthosite rocks, which are a recent intrusion in the gneiss and limestones, and the amount of titanic acid in these sometimes reaches 45 per cent, which renders the ore practically useless on account of its great refractibility, and the consequent large amount of fuel necessary to reduce it to a state of metallic iron. Attempts have been made from time to time to utilize this ore, but always with disastrous results to those interested.

The true magnetites are found at many points and furnish an ore often of great purity and value for smelting purposes. They occur in the vicinity of Hull where they were mined extensively, and where they were also smelted for some years, though operations in this locality have now been suspended for nearly a quarter of a century. In Bristol also there are large deposits of this ore which have also been extensively worked, but its value is to some extent affected injuriously by a certain

percentage of sulphur which necessitates a roasting process before it is sent to the smelter. As a consequence the demand for these ores has of late years largely fallen off. The same association of sulphur is found in some of the deposits along the Kingston and Pembroke Railway, and seriously impairs their value as smelting ores, so that the hopes which were raised in regard to their speedy utilization by the building of the Hamilton smelter have not yet been realized. All the ores in this district are not, however, affected in this way, and there are some large deposits of excellent quality ; but on the other hand these are sometimes so far removed from convenient shipment that the price obtainable will not repay the cost of hauling to railway and the subsequent freight to the smelter. It can be easily seen therefore, that though there may be a very large amount of raw material available, this is not always in such a shape as to yield profitable returns. This condition of affairs is unfortunate, and many persons unacquainted with the actual conditions, often wonder why mining is not pursued with greater vigour in certain directions. Investors of small capital, however, generally wish to see some chance of realizing on their investments when once mining operations are commenced, unless as is sometimes unfortunately the case, such investments are made on a limited scale with simply a view to speculation. Such schemes cannot, however, be classed under the head of legitimate mining, and the last investor generally has the experience obtained as his share of the profits.

Improvements are constantly being made in the process of iron smelting, and therefore we may hope that with greater facilities for shipment and reduced expenses in smelting, the greater part of these ores will some day become valuable assets. At present the great barrier to the successful development of the blast furnace industry in this district, is the cost of fuel, and it is to be hoped that some day in the not too distant future, the successful manufacture of compressed peat will go far to solve this difficulty. Smelting with peat fuel has been carried on successfully for many years in Norway and Sweden and also in

Germany ; and there is no reason why methods which are so successful in those countries should not be equally so here, provided the greater cost of labor be not an insuperable obstacle. Figures given by the American expert, Birkenbine, for the Ottawa district, some years ago, placed the cost of manufacture, even under the then unfavorable conditions, at such a price as to fairly warrant investment at some central point such as Ottawa city, and to make the erection of a blast furnace profitable, but the initial cost of such an enterprise is heavy and investors prefer often to take their chances in some more gilded scheme, even though, as is often the case, the results are not always very flattering. However this country is as yet comparatively young in mining matters and the attention of foreign capitalists is now only being directed to this portion of the empire as a field for profitable investment, so that it is not worth while to become greatly discouraged over a present depression along certain lines.

GRAPHITE.

Among the other mineral industries that at some not far distant day promise to be a very important factor in the country's development is the mining of graphite. We have in the Ottawa district some of the largest and most valuable deposits of this mineral anywhere known, and easy of access, and though efforts have been made in a half-hearted way for some years to turn these to profitable account, such attempts have been so carried on as not to yield satisfactory returns. In such a case we should not attribute the lack of success to any fault on the part of the ore deposit, since this has been thoroughly investigated in the laboratory of the Geological Survey, and the mineral found to equal in quality, for all practical purposes, that from the celebrated mines of Ceylon, which so largely enter the markets of the world to-day. The failure rather seems to be on the part of those who have the mines in charge, and to their lack of enterprise in seeking a market, since the Canadian market alone consumes annually a sufficient amount of this material to warrant the workings of these deposits on a large scale. Thus

from the official bulletin of the Survey we find that in the ten years, from 1886 to 1895, the quantity of graphite produced in all Canada, including the output from New Brunswick, amounted in value to less than 30,000 dollars, while the value of the imports of this material for the sixteen years from 1880 amounted to over half a million dollars. This is certainly a bad showing in the face of the fact that we have more than enough of the the raw material to supply all our own needs and to furnish plenty for export besides. Certain changes now in contemplation may in a few years result in effecting a marked difference in the balance of these figures, but this will only be done by changing entirely the present inoperative system of management. At one mine north of the Madawaska River, not many miles north from the Kingston and Pembroke Railway, there is a wonderful deposit of this mineral, the amount in sight being apparently sufficient if properly handled to supply the market alone for some years, while the great deposits of the Buckingham district have as yet only been opened sufficiently to show their great extent and value.

MOLYBDENUM.

The peculiar mineral molybdenum which has recently come into prominence in mining circles, is somewhat widely distributed through the crystalline rocks of the Ottawa basin. In physical features it is sometimes mistaken for flake graphite which it resembles strongly in the field. Along the Ottawa River it occurs in limited quantity in certain of the rocks on Calumet Island, though the extent of the deposit here has never been ascertained, but at or near Haley Station, on the Canadian Pacific Railway, there is a large deposit of this mineral which has been worked for some years in a desultory fashion. Recently, however, the mine has been reopened and a considerable output is now being obtained for shipment. Along the Gatineau River this mineral is found in several of the adjoining townships, but apparently the most important deposit yet located in this direction is in the township of Egan, north of the Desert River, where it appears to have a large development. It

is usually found in connection with white granite dykes which cut the crystalline limestone and associated gneiss of the Grenville and Hastings series, which have a wide extent in this area, both north and south of the Ottawa. The market at present for this mineral is not large, but the demand has increased rapidly within the last three years, so that there is a fair prospect of some of these deposits being utilized at no very distant date.

ASBESTUS.

Of the peculiar mineral asbestos, or rather chrysotile, of which you have all heard, though there are limited deposits at several points, they are of such small extent, as compared with the great deposits in the Eastern Townships of Quebec, that it may be safely said we cannot hope to successfully compete with these in the matter of production. In point of fact, the great deposits of this mineral in Quebec have practically closed down the output of the mines for the rest of the world, at least as regard the finer qualities. Asbestos proper is a variety of hornblende, and is found and has been worked for some years in the County of Hastings under the name of actinolite. What passes under the name of asbestos in commerce is a fibrous serpentine or chrysotile, which has a soft, beautiful and silky fibre, of great tenacity and strength, so that it can be readily teased out, spun and wove, or made into rope, while the shorter and more imperfect fibre is used for millboard, packing, and for a variety of purposes. Its great value depends upon its capacity to resist combustion, that is, it is practically a fire-proof material.

In connection with some of the limestones of the Grenville series there are certain serpentinous bands which contain small veins of this substance and these have been mined at a number of points, though the small size of the fibre prevents it from competing with the longer material of the Eastern Townships. This Ottawa product is, however, utilized for the manufacture of a celebrated fire-proof plaster which possesses many advantages over the common variety for interior work, and this is rapidly growing in favor with builders, so that the industry promises to

assume large proportions at some time, though there are not the large profits which are obtainable from the mines of the eastern district.

GOLD.

The mining of the precious metals has always possessed a charm for many persons, though there is probably no enterprise in which more money has been lost than in the attempt to obtain gold from the hard matrix in which it is usually found. Still there is always a great fascination to most persons in the term gold-mining, though the ideas many people possess on the subject are exceedingly crude. The discovery of gold in any country usually gives rise to much excitement, and this is often in direct ratio to the remoteness of the locality where the find is reported. Gold mining has too large an element of uncertainty in it to be pursued by the ordinary citizen with profit. To say nothing of the capricious nature of this mineral itself there is often the temptation on the part of the unscrupulous miner to salt his claim and thus impose on the ignorance or credulity of his neighbour. Then there is frequently the dishonesty of the assayer to whom the samples selected as a fair test of the property are sent and of these, I regret to say, the making of false returns is sometimes a matter of business in order that more samples, and the necessary fees for testing the same, may come his way. In fact, some of these assayers have been known to boast that they could get an assay of gold from any kind of rock, or even from a piece of brick if necessary; so that the report of a so-called assayer, for there are some that disgrace the name, is not always to be relied on as absolutely correct.

The gold of the Ottawa district may be said to belong to the Huronian belt of rocks which traverse a portion of Ontario in the counties of Addington, Hastings, Lanark and Renfrew, and which also crosses the Ottawa River into the province of Quebec. These rocks have been described in the reports of the Geological Survey under the head of the Hastings series. They have been by some regarded as a portion of the Laurentian

system, while by others they are regarded as belonging to a higher division, the evidence in favour of the latter view being that generally accepted at the present time. The occurrence of gold in certain portions of these rocks was ascertained as early as 1865-66 in the neighbourhood of Marmora, and several mines were shortly after opened in that locality which gave great promise of good returns. Since that date this industry has been pursued with varying success, and with gradually improved methods of treatment this area will yet probably give satisfactory results. As a rule the gold of this formation is associated with various sulphurets which renders its separation from the quartz a somewhat difficult matter, and expensive methods are necessary for its profitable extraction. The difference between this ore and the free milling gold quartz lies chiefly in the fact, that in the latter the gold readily separates from the gangue after crushing and amalgamates easily with mercury, while in the arsenical ores, like those of the Marmora district, as also in some of those from Nova Scotia, the separation has to be secured by expensive chemical treatment.

No definite returns are to hand as to the actual output of the gold mines in this district, but it has varied greatly at different times. Assays from several mines in the Madoc and Marmora district have shown a very high percentage of the precious metal. Lately the gold bearing rocks have been recognized at different points nearer the Ottawa, and assays from some of these localities have given very satisfactory returns. Unfortunately however in many cases the veins of quartz are small and irregular, and there appears to be a good deal of uncertainty as to whether these can be properly manipulated. Small quantities of gold can be obtained by assay from many of the veins which traverse the rocks of this formation.

In the Report of the Geological Survey for 1878-79, an analysis is given of a sample of bluish-grey quartz, traversed by small veins of a light green apatite, which is reported as coming from the Peche Village, township of Wakefield. The results of this assay surpass anything yet found in the rocks of the Ottawa

district, the amount of gold per ton of quartz of 2,000 lbs. being stated at 11.725 ounces and of silver, 52.323 ounces. The size of the sample from which this assay was made was small, and if the vein from which the specimen was taken could be located there would seem to be a prospect for further developments in this direction.

It may not be out of place here to suggest that the attempts to obtain accurate information as to the quantity of gold contained in the quartz veins, which traverse many of the rocks in the Ottawa district, by mere assay of small samples is never likely to prove satisfactory. This can only be done by submitting a large sample of from one to three tons to a special mill test. Such tests can now be readily made in the new mining schools of Kingston or McGill college, and in this way definite knowledge can be obtained as to the commercial value of the ore, and the possibility of obtaining satisfactory results from its extraction.

It is very interesting to notice in connection with the occurrence of gold in this area that the same agencies which have played so important a part in the development of the deposits of mica and apatite, viz., that of intrusive granite or diorite, have also been exerted here. Thus it has been clearly shown that all the most productive mines are situated in close proximity to igneous masses which have penetrated the country rocks, generally composed of schists and slates, and it may be broadly stated that the same general principle applies to all the valuable mining areas both to the east and west. The productive mineral zones of the Lake Superior district conform to this general rule, and the deposits of copper and nickel at Sudbury are also found in intimate associations with great intrusions of granite and greenstone. It would therefore seem to be a well established fact that these intrusive masses have exercised a direct and favorable influence upon the presence of the economic minerals.

In the new group of mines on the Calumet Island, up the Ottawa, the masses of blende and galena are always found con-

nected with the diorites of that area, and the new showing of nickeliferous pyrrhotite on the same island has a large mass of diorite close to the development of the ore. These diorite and granite masses in this locality clearly break through the associated crystalline limestone and associated gneiss.

As for copper, the Ottawa district has as yet failed to produce anything of economic importance, but the silver-bearing galenas of Lake Temiscaming which have been opened up, appear to have a somewhat extensive development, though mining in this quarter has of late years languished. In the Wanapetae district however, which is on the western border of the Ottawa basin, very valuable deposits of rich gold ore have been recently exploited and are now being worked with good prospects of profitable returns.

COAL.

Coal, of course, has never been found in the Ottawa country, though scarcely a year goes by without the usual newspaper paragraph to the effect that a large bed of this mineral has been discovered in the area to the north of the upper St. Lawrence. To many, this absence of coal has seemed a mystery, and of late several severe attacks have been made upon the scientific authorities in connection with deposits of so-called coal in the Sudbury district to which the attention of everyone was recently directed. The true coals of the eastern provinces are confined almost entirely to the middle portion of the Carboniferous system, which lies at a much higher position in the geological scale than any of the rock formations of Ontario, which do not reach above the horizon of the Devonian. In one area in New Brunswick in this last formation there is a deposit of graphitic anthracite which has a thickness of several feet and which was persistently boomed for some years, and caused a lot of money to be wasted in an attempt to place it on the market as a first-class fuel. This hope has never been realized from the fact that the mineral contained too great a percentage of ash and graphite to burn well, the amount of residue after combus-

tion being nearly 40 per cent. There are, however, in some of the formations in Ontario and Quebec, notably in the Trenton and Utica, certain black bands of highly bituminous shale which, when ignited in a strong flame will burn till the greater part of the contained bitumen is consumed. The same bituminous character is seen in some of the shales of the lower Carboniferous formation of New Brunswick, and some of these are so rich as to yield over 60 gallons of oil to the ton, and slabs of this material placed on a camp fire will burn for a long time when once ignited. These cannot however be called coal deposits, though they contain so large a quantity of carbonaceous matter, and it would almost be as well to style our mines of graphite coal mines since graphite is also a form of carbon. Thus, the mineral found at Sudbury is certainly a carbon and will burn under certain conditions, but if there is too large an amount of ash it cannot compete readily with the better class of coals which are now used ; and besides the uncertain nature of such deposits, as contrasted with the great beds of the true coals, renders the investment of capital a very risky matter.

This question of Ontario coal came before the Geological Survey in the early days of its existence, and a rather good story is related in the life of Sir William Logan bearing upon the early operations in this direction.

Nearly forty years ago boring operations were commenced near Bowmanville with the intention of finding coal there, in spite of the old geologist's advice ; and after some days pieces of the mineral were frequently obtained. This, to many persons, was quite conclusive evidence that a true coal field had been reached. So much were some of these persons impressed with this discovery that one of Sir William's old friends, the sheriff of the district, came down to Montreal, where our offices were then located, and in a great burst of confidence, produced a sample with the request to know if that wasn't coal. Sir William, ever courteous, replied that it was most certainly coal, and a very good sample of Newcastle coal at that. " But," said the sheriff, " I saw it taken out of the hole myself." " Ah, yes,"

said the old knight, "and if you had been there a little sooner you would probably have seen them putting it in too." A few days after, in taking out some other samples of coal from this hole it was found that these were mixed with bread and cheese, showing that the person who so ingeniously "salted" the property had not been sufficiently careful in the selection of his ingredients. A subsequent investigation showed conclusively that the bore-hole had not even passed through the clay covering, and that the solid rock had never been reached, so that this attempt to start a coal mine in Ontario was a dismal failure. A similar attempt at coal discovery in Quebec was made on the north side of the St. Lawrence, below Quebec city, but a careful examination of this mine also showed it to consist of pieces of the mineral which had been stuck in the clay along the course of a small brook, so that this attempt also fell flat.

It would certainly be a wonderful thing and a great benefit to the industries of this district, if coal in workable quantity could be found anywhere in this area, but until the present geological conditions change very materially, it is to be feared there will never be any very great development in this direction, and the only alternative, if we wish to use our own fuel, is to utilize some of our great deposits of peat.

The question of natural gas and oil along the St. Lawrence has already received some attention, and will doubtless before long be again taken up. The developments along the east side of that river in the vicinity of Nicolet by boring, though carried down to a comparatively small depth, proved that natural gas does exist in that area, and it was obtained in considerable quantity at the first attempt. A large vein of gas was at one point struck at a depth of less than 600 feet, which came out with such force as to wreck the plant and hurl mud and stones many feet into the air. The hole was not however continued down to the Trenton, which was supposed to be the great reservoir of this material, owing to a lack of capital on the part of those interested; but the abandoned hole is still discharging gas in considerable quantity. It is the opinion of those who

have studied this field, which has a very extensive development to the east of Montreal, as well as along the valley of the river northward, that the prospects for obtaining this material in commercial amount are very good. In the lower Ottawa basin the greatest development of the rocks from the Trenton up to the Medina red shales, which is a succession precisely like that where the tests were made at Nicolet, is in the townships of Russell and Gloucester. No attempt has as yet been made to test this portion of the Ottawa basin, and nothing further can be said as to the probability of finding natural gas in this area, except that the strata are apparently undisturbed and there is a heavy capping of shales overlying the Utica and Trenton formations. Further east on the bank of the South Nation River a shallow boring was put down several years ago which produced gas in considerable quantity, and in this respect the area resembles that of the St. Lawrence. Several borings have also been sunk near the line of the Canada Atlantic Railway for water, as also near Caledonia Springs, but these, though they reached a depth at one place of about 800 feet, started below the surface of the Trenton and gave no results as to the presence of gas or oil. The upper formations of the Utica and Lorraine are absent from this portion of the basin, so that the area is not a typical one for tests of this kind. The discovery of natural gas in the vicinity of Ottawa would be of such great importance that one trial, even if attended with failure, should not be allowed to condemn the enterprise. In the case of the boring made within the city limits some years ago, it may be said that no results in this direction should have been expected. The boring started on Trenton limestone and in a part of the formation much broken by faults, so that if ever gas existed in that area it had an excellent chance to make its escape long before the bore-hole was started.

It would of course be rash to state that borings in the Palæozoic formations, south of the Ottawa, would result in finding either gas or oil in profitable quantities; and in this connection it may be stated that, in so far as explorations along these

lines have progressed in the western portion of the province, the best results have been obtained from formations much higher in the scale. Thus the large flows of gas in the western part of the province have resulted from the piercing of the Clinton or Medina, the latter only of which is represented in the Ottawa basin, while the Trenton formation which was pierced nearer Lake Ontario has as yet produced much less satisfactory results. Hunt, while claiming that the petroleum of Canada occurs at two horizons, viz., the Trenton and the Corniferous of the Devonian, shows that the great flows of oil in the Petrolia district proceed from the latter, though it is supposed that in some of the oil fields the true source of the material may be some of the lower formations. In Gaspé, where also there are well marked indications of oil, these seem to be more closely connected with certain beds of the upper Silurian rocks, intermediate between the Trenton and the Devonian.

Of building stones, such as sandstones, limestone, granites, marbles, &c., there is a great variety, and some of the deposits already opened up are of great value. The production of these things depend upon the law of supply and demand, and as the latter is constantly increasing as the country is developed, the enquiries for new quarry locations will also increase. At the Chicago exhibition one of the largest dealers in granite did not seem to know that we had a supply of such material in Canada, and when told that there was an unlimited quantity at readily accessible points, declared that he would investigate these at the earliest opportunity. In fact many of these coarser materials only require to be brought prominently into notice to start a demand, as in the case of the feldspars which have only become known as a commercial product within the last three years. Now feldspar, which is used in the manufacture of pottery, is being looked for everywhere in the old rocks; and though the heavy freight rates to the United States are a great drawback to its export, except where these deposits are near a line of railway, yet they might easily be utilized here where the raw material is cheap and plenty. If the manufacturers can afford

to carry on a business with this material by paying five dollars a ton, the same industry ought to be a success here where we have the raw material at our doors. What it requires is capital and enterprise with a good amount of push. The felspar which is being mined is found as a portion of some of the many granite dykes that traverse our older crystalline rocks, and the proviso for its usefulness is that it shall be free from iron and mica, its shade of colour, either red or white, apparently not making any difference in its market value.

The brick clays of the district are widespread. Many of the deposits are of excellent quality, and the quantity of bricks and tiles already produced is very large and constantly increasing. This may be seen at a glance by comparing the figures of import in drain tiles, &c., for 1888 with those of 1895. Thus in the former year these were imported to a value of over 100,000 dollars, while six years later so greatly had the home development increased, that these figures had been reduced to 21,000 dollars. The manufacture of terra-cotta has also grown to a comparatively large industry, or from 50,000 dollars in 1888 to nearly 200,000 in 1895. These manufactures from some of our commonest and most widely spread materials show that even in this direction there is yet great room for development; yet on the part of many persons the widespread nature of such raw material is such as to cause them to be considered as almost valueless as sources of mineral wealth. Even of such ordinary things as sand and gravel there is a great possibility of development if only the right characteristics can be found, as may be inferred from the fact that the increase in their export between the years 1887 and 1895 has been no less than 90,000 dollars. These last figures do not of course apply to the Ottawa district alone, but are given as indicating possibilities for future development along the line of some of the most common materials.

The bottoms of many of our lakes in the area to the north and south of the Ottawa are filled with great deposits of shell marl which in some places is being extensively used in the manufacture of cement, and for which there is a large market for a

first-class material ; while as a fertilizer for certain lands it also possesses much value and could, if properly handled, become a source of revenue. In fact along all lines of mineral development there must always be a constant outlook for the chances of a market. It is of but little use to fold one's hands and think these things will develop themselves. They do not appeal to one's fancy so strongly as the flaming stories of the occurrences of gold or silver, but they are very often quite as important factors in the country's development. They certainly afford quite as good opportunities for bringing dollars into the pockets of the manufacturer or capitalist as many of the more showy minerals, while there is much less of the speculative element. The amount of capital necessary to their successful development is very much less in most cases, and there is not so great an element of risk involved in their exploitation.

In this hasty sketch of some mineral resources of the Ottawa district which of necessity has only touched in the briefest way, upon some of the main features of the subject, it will be seen that in this area there is not only a very great variety of material but much of this is in very large quantity and also that the mineral development in so far as it has proceeded, has been fairly satisfactory.

CORUNDUM.

There is however one other mineral which I have neglected to mention, and which can hardly as yet be recognized among the sources of our wealth, since its development has not as yet taken place, viz., the new mineral, corundum. The finding of this mineral marks a new era in Canadian mining, and the recent discovery of large deposits in the northern portion of Haliburton, whence it has been traced east for some miles into Renfrew county, is of great importance, not only as marking for the first time the occurrence of this mineral in Canada, in quantity sufficient to be of economic value, but from the great value of the mineral itself, provided the tests now being made prove it to possess all the qualities which belong to the corundum of

commerce. The quantity so far found appears to be sufficient to supply the demand for many years, and there should shortly be a marked development along lines of production. The imports of emery in 1895, which it is supposed this mineral will replace, amounted to nearly 15,000 dollars, but as there is a large quantity from abroad into the United States, it may be expected that the Canadian mines should contribute largely in that direction. The development of this area will be eagerly looked for. The mineral occurs in connection with certain areas of intrusive rocks in the crystalline series, chiefly granites and syenites, which are found over a large extent of country in the vicinity of the Madawaska River to the south of Barry's Bay, which is at the present time the nearest point of shipment, by the Ottawa and Parry Sound Railway. There are large areas of these old rocks, many of which are now very difficult of access, but which will, in process of time, become more readily accessible, and doubtless large stores of mineral wealth, whose existence we can now only conjecture, will be discovered. Many of these valuable deposits are found out only by conditions of settlement or by railroad building, as was the case in the great asbestos areas of the Eastern Townships of Quebec, which were first made available by the construction of the Quebec Central Railway, the areas traversed by that line in this locality being previously regarded as of no economic value on account of the rocky and barren character of the district, yet from a small and rocky patch of a few hundred acres there have been taken in the seventeen years since 1880 almost 6,000,000 dollars worth of asbestos, or almost the entire supply for the world's market.

It may, therefore, be confidently anticipated that as our country becomes more and more developed, fresh deposits of mineral wealth will be disclosed, as indeed is only to be expected in a comparatively new country like this, containing such a vast stretch of mineral-bearing formations. Prior to the building of the Canadian Pacific through the rough country to the north and west of Lake Superior, which had up to that time been almost inaccessible, we had no idea of the great and ever increasing

stores of mineral wealth which have of late years been revealed in that area, and the present development of our western Ontario gold fields was an impossibility. The same remark applies to the great deposits of nickel at Sudbury, which were disclosed by the building of the Canadian Pacific, while it is only in the last three years that the new and valuable finds of corundum have come to light, as a result of the explorations of the Geological Survey.

In all attempts at mineral development there are of necessity a host of schemes placed on the market which are largely speculative. This seems to be an unavoidable evil, but it also, unfortunately and seriously, interferes with the actual business of legitimate mining. Areas practically worthless are placed before the public under high sounding names, and in the rush after speedy wealth many of these are assumed by the uninitiated to be of equal value with those which are clearly of economic importance. The resulting disappointment on the part of the holders of stock in worthless properties tends to bring discredit on whole areas of valuable lands, and results in very serious injury to the mining interests of the country at large.

Another great source of harm to legitimate mining is the misstatements of certain persons, who, under the guise of mining experts, travel the country and pretend to discover valuable mineral deposits, sometimes by the aid of the mineral rod and sometimes by means of experience, supposed to be gained in other mining fields abroad; and it is a curious thing to note that, if the so-called expert or prospector can claim to have been in Australia or California, his dictum is held to be quite conclusive as to the value of any mining property, even if any experience so obtained may only be acquired as the result of shovelling away the accumulated debris from around the surface of the pit. Such experts, it may be said, generally do more harm than good in so far as deciding on the actual value of a mining area, and many owners of comfortable farms throughout this country have speedily lost all their property by following the lead of such blind guides. The peculiar properties of the

mineral rod, so implicitly believed in by many persons, as an agent in mineral discovery, have yet to be proved. There are, however, many people who place the utmost confidence in its working, and who claim to be able to infallibly locate the different kinds of minerals by its use, as well as to determine the extent and value of the ore beds and the depth at which these will be reached. In many cases where the information so revealed has been followed up, dire misfortune has been the result and the money so invested has been wasted.

There is without doubt much wealth hidden in the rocky strata of the Ottawa district, but it requires care in the investigation, and capital and strict business methods in the development, to, in most cases, ensure profitable returns. It is not, as a rule, a profitable thing for men not trained to this line of work, to throw aside their ordinary legitimate business, whether of farming or the mechanical pursuits, to rush after what, in many cases, is a merely chimerical attempt to obtain wealth, by digging out the various ores of copper, gold, silver or iron, when there are surer sources of income nearer home. Ultimate success in mining requires the application of skill and capital, often in almost unlimited amount, and the attempt by the individual, which would almost certainly result in failure, is often attended with success when undertaken by properly organized and equipped companies, working in the right direction and with proper methods.

UNDER the title "Flora of Ontario" the Education Department of Ontario has issued a list of the flowering plants and vascular cryptogams known to occur in the Province of Ontario. The typographical work and general arrangement of the list could not be improved upon, and its convenient size enables one to carry it into the field.

No more useful or convenient Botanical list has ever been published in Canada.

BRITISH COLUMBIAN DEER.

The following letter from Mr. J. A. Teit of Spence's Bridge, B. C. is of interest both to the naturalist and the sportsman. Mr. Teit has lived in British Columbia for 15 years, is a careful observer and has had abundant opportunity for studying the animals of that province :—"There are three or four varieties of Western Deer known to me which are distinguishable chiefly by their tails. Now here in the interior there is :—

1st. A deer of large size, one of the largest, if not the largest, variety we have. Some of the old bucks have very large and thick horns, probably their horns grow to a larger size and are thicker than those of any other variety we have. The face is generally slightly concave although with some the reverse is the case. At the same season of the year there are two shades of color to be observed amongst them ; some are more greyish others more brownish. Their tail is *white all around from the root down to the tip* which is black. They are the commonest deer throughout the North Western portion of the "Dry Belt" (the Thompson, Bonaparte, Chilcote, &c.) and are also very common in the Similkameen, the Okanagan, and in some parts of Kootenay. Some people call them Mule Deer. Others call them Black-tail and some call them American Deer.

2nd. A deer almost the same as the first and equal or nearly equal in size. Color of the body the same and ears just as long. The under part and the sides of the tail are white from the root down to the tip, which is black. The *back or outer part of the tail* is of the *same color as the body* and this stripe is *continuous from the body until it joins the black tip*. With some of them this stripe on the back of the tail is *very narrow* (about half an inch or less in width.) These deer are not so common in the Dry Belt as the first variety but are found along with them in most places. They are found on the Thompson, Bonaparte and Fraser rivers as far down as the canyon or even below, also around Lillooet and probably in most parts of the interior where the first

variety is found. Like No. 1 they are called Mule Deer by some and Black-tail or American Deer by others.

3rd. A deer of very small size, and with light and rather small horns. The color of the body and markings nearly the same as the first two varieties. It inhabits very bushy parts of the country and is not so timid as other varieties of deer. It is found in parts of the country where the climate is moist. It is the common and probably the only variety of deer on the coast, Vancouver Island and islands of the Gulf of Georgia and is said to be found also in some of the moister and more forested parts of the interior especially near lakes which are wooded. Its tail is the same as the 2nd variety, only the stripe on the back of the tail (which is the same color as the body) is *much wider* and there is hardly any white to be seen at the sides of the tail. These deer are called Coast Deer or Pacific Buck and are also very frequently named Black-tail.

4th. A deer of about the same size as the first variety and very similar to it in every way, excepting the tail which is longer and altogether white. It is found in the "Dry Belt" from the Thompson south, especially in the Similkameen and in some parts of Kootenay. It is called White-tail, Flag-tail Virginia Deer, and Long-tailed Deer. I would like to know the proper names of the four varieties of deer outlined above, and also if there are any other varieties to be found west of the Rockies in these latitudes.

Yours very truly,

J. A. TEIT.

No. (1) Does weigh (when in prime condition) 100 to 150 lbs., bucks 200 to 275 lbs. A few weigh about 300 lbs. or over, and very rare specimens have been obtained which went as high as 400 lbs., and even more. These weights are average and for deer without the entrails removed.

A buck (with entrails removed) weighing 230 to 260 lbs. is considered an average *fine* one. Freaks are sometimes obtained of this kind of deer and also of No. (4). I knew one of the latter,

a doe shot by an Indian, which had two small horns. About three years ago a half-breed shot a doe of No. (1) variety, which had one long horn on one side of the head. There was no sign of any horn on the other side. Whitish or grey colored specimens of Nos. (1), (2) and (4) have been occasionally seen or shot, but they are very rare, and are probably albinos. I saw some time ago a very white specimen of a fawn taken from its mother's body, probably about two or three weeks before its time for birth. The skin had a very few red spots on it. Skins of albino deer, especially fawns, were formerly of some value and prized by Indian medicine-men for making tobacco pouches, etc. They were supposed to bring good luck.

No. (2). The white spot on the throat of this variety is often more pointed at the sides than that of No. (1).

No. (3). These deer are just about half the size of the other varieties of deer. Prime bucks weigh about the same as does of No. (1) and others, and does seldom weigh more than 75 lbs. The profile of this variety on some parts of the coast is frequently slightly convex.

I myself have been accustomed to call the variety first described Mule Deer, the second, Black-tail (of the interior), the third, Black-tail (of the coast), the fourth Virginian or White-tail.

In reply to Mr. Teit's queries Prof. John Macoun, Dominion Naturalist, has written:

"No. 1.—This is the true Black-tailed Deer (*Cariacus macrotis* Say.) Also called Mule Deer.

No. 2.—This form was first seen by Lewis and Clark and from their description was named *Cariacus macrotis* var. *Columbianus* by Richardson. This is also a Mule Deer or Black-tailed Deer. In 1854 Anderson and Bachman changed the name to *Cariacus richardsoni* and hence the name Richardson's Deer—by which it is generally known.

No. 3.—Lord in his book "The Naturalist in British Columbia" calls the small coast deer *Cariacus Columbianus* and

does not separate the two inland forms, but names them both *C. macrotis*. This, (No.3), is the Columbian or Coast Deer.

No. 4.—This is *Cariacus Virginiana* var. *leucurus*, Dougl. the western form of the eastern White-tailed Deer.

Mr. Teit's descriptions are evidently accurate and he sets out the forms so distinctly that there can be no doubt about the species.

ORNITHOLOGY.

Edited by W. T. MACOUN.

WINTER BIRDS AND EARLY SPRING ARRIVALS.

The abundance or absence of winter birds is often decided to his satisfaction, by the casual observer, just in proportion to the number of pine grosbeaks which he sees during the winter months, and as these birds were not seen this year, notwithstanding the fact that there was such an abundance of food for them, the conclusion naturally arrived at was that other birds were scarce also. This conclusion was correct this winter to a large extent, as during the early part of the winter few birds were seen, with the exception of crows, which have been quite abundant all winter at the Experimental Farm.

The first spring birds were nearly a month later in coming this year than last, and only a comparatively small number have yet arrived. In the following list the winter birds are recorded and also those which have arrived up to the 14th April. It is hoped that all those who sent in their notes last year will continue to do so this season. The notes of any others who are especially interested in birds will be gratefully received.

1898.

Nov. 15—SNOWFLAKE, *Phlectrophenax nivalis*. Flock at Experimental Farm. Mr. Wm. Saunders.

1899.

Jan. 29—AMERICAN GOLDFINCH, *Spinus tristis*. Several feeding on birch at Beechwood. Mr. Geo. R. White.

30—SHARP-SHINNED HAWK, *Accipiter velox*. Mr. Geo. R. White.

- Feb. 5—PINE SISKIN, *Spinus pinus*. Several below Rockcliffe; also flock on 21st. Mr. Geo. R. White.
- 14—AMERICAN GOLDEN EYE, *Glaucionetta clangula americana*. Two male birds. Mr. F. W. Warwick, Buckingham, P.Q.
- 20—AMERICAN CROSSBILL, *Loxia curvirostra minor*. Small flock of six feeding on pine cones, and two males and one female feeding on fruit of mountain ash, 10th April. Mr. Geo. R. White. Mr. Lees reports seeing several on the 12th; they were seen by other people at different times, but no other dates have been sent in. Some of the birds were young. The bills of these were not crossed.
- 25—AMERICAN MERGANSER, *Merganser americanus*. Mr. Geo. R. White.
- 25—CHICKADEE, *Parus atricapillus*. A few seen during the winter.
- Mch. 10—AMERICAN CROW, *Corvus americanus*. Mr. Geo. R. White. Crows were abundant all winter, but this was the first date on which they were recorded.
- 15—PRAIRIE HORNED LARK, *Otocoris alpestris praticola*. Dr. Fletcher. March 23rd, Mr. Geo. R. White.
- 17—PHOEBE, *Sayornis phoebe*. One caught; Miss Harmer; April 16th, Mr. W. T. Macoun.
- 22—PURPLE FINCH, *Carpodacus purpureus*. Mr. Geo. R. White. Flock feeding on fruit of mountain ash; 23rd, Mr. W. T. Macoun.
- 22—WHITE-CROWNED SPARROW, *Zonotrichia leucophrys*. Mr. Geo. R. White. One male; probably remained over winter.
- 29—RED POLL, *Acanthis linaria*. Mr. Geo. R. White.
- pril 6—BRONZED GRACKLE, *Quiscalus quiscula*. Three males. Mr. Geo. R. White; April 7th, Mr. C. H. Young.
- 6—ROBIN, *Merula migratoria*. Seen by men at Experimental Farm. April 8th, Mr. Geo. R. White; Mr. W. T. Macoun. Recorded first on March 15th, 1898.
- 6—RED-WINGED BLACKBIRD, *Agelaius phoeniceus*. Mr. C. H. Young.
- 6—SONG SPARROW, *Melospiza fasciata*. Mr. C. H. Young. April 7th, Mr. Geo. R. White; Mr. W. T. Macoun. Recorded first on March 11th, 1898.
- 7—SLATE-COLOURED JUNCO, *Junco hyemalis*. Mr. Geo. R. White.
- 7—BLUEBIRD, *Sialia sialis*. H. Fixter. One seen by Mr. Geo. R. White on the 13th.
- 10—TREE SWALLOW, *Tachycineta bicolor*. Mr. Geo. R. White. A small flock of nine near old rifle range. Numerous on 11th.
- 14—TREE SPARROW, *Spizella monticola*. Mr. Geo. R. White. Four seen near city with Juncos.
- 14—YELLOW-BELLIED SAPSUCKER, *Sphyrapicus varius*. Mr. Geo. R. White. Five seen near city.

PROGRESS OF GEOLOGICAL WORK IN CANADA DURING 1898.*

By H. M. AMI, M.A., F.G.S.

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Adams, F. D.—*Recent experiments on the flow of rocks carried out at McGill University.* Scientific American, April 23, 1898.

Ami, H. M.—*Notes on the Geology of Chelsea, Que., and some of its bearings on the Geology of Ottawa.* Ottawa Naturalist, vol. 11, pp. 125-127, Sept., 1897. Reprinted with emendations, issued 1898, Ottawa, Canada.

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Ami, H. M.—*Fresh water found by boring in granite and other hard crystalline rocks.* Ottawa Naturalist, vol. 12, No. 4, pp. 89-90, 1898, Ottawa, Canada.

Ami, H. M.—*The Geological Society of America—Tenth Winter Meeting, Montreal, Canada, 1897.* Ottawa Naturalist, vol. 11, No. 12, pp. 221-224, Ottawa, Canada, 1898.

Ami, H. M.—*Obituary, James Hall, Paleontologist.* Ottawa Naturalist, vol. 12, No. 6, pp. 114-115, 1898, Ottawa, Canada.

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Bailey, L. W.—*Dr. James Robb, first Professor of Chemistry and Natural History in King's College, Fredericton—A sketch of his life and labours.* Bull. Nat. Hist. Soc. N.B., Article 1, No. 16, vol. 4, pt. i, pp. 1-15, giving list of publications and writings, St. John, N.B.

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*One or two papers not previously noticed belong to the year 1897.

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Chalmers, Robert—*The pre-glacial decay of rocks in Eastern Canada*. Amer. Journ. Sc., series 4, vol. 5, pp. 273-282, April, 1898.

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Coleman, A. P.—*Canadian Pleistocene Flora and Fauna*. "Report of the Com., consisting of Sir J. W. Dawson, Prof. D. P. Penhallow, Dr. H. M. Ami, Mr. G. W. Lamplugh and Prof. A. P. Coleman (Secretary), appointed to further investigate the flora and fauna of the Pleistocene beds in Canada." Brit. Assoc. Sec. C., Bristol, 1898, 8 pp., Appendix, Pleistocene of Don Valley, by Prof. D. P. Penhallow.

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Dawson, Sir J. W.—*Addendum to note on Nova Scotia Carboniferous Entomostraca, in number for January, 1897*. Can. Rec. of Science, vol. 7, p. 396, July, 1897, issued July, 1898, Montreal, Canada.

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Willmot, A. B.—*Notes on the Michipicoten gold-fields.* Journal Federated Canadian Mining Inst., vol. 3, pp. 100-102, 1898.

Willmot, A. B.—*Michipicoten mining division.* Report of Bureau of Mines of Ontario, vol. 7, pt. 2, pp. 184-206, map, 1898, Toronto, Canada.

Wilson, W. J.—*Notes on the Pleistocene geology of a few places in the Ottawa Valley.* Ottawa Naturalist, vol. 11, pp. 209-220, March, 1898, Ottawa, Canada.

HONEY BEES ACCLIMATISED.—On the 27th of April, I again visited the bee-tree at Rockcliffe, referred to in the November, 1898, issue of THE NATURALIST and although late in the afternoon was pleased to find that the bees had again successfully wintered, as was evidenced by the marked activity above the entrance of the cavity in the tree. From the large number of bees to be seen coming and going, it seems probable that this colony has wintered quite as well, if not better than the average colony kept under artificial conditions.—P. H. SELWYN,

NOTES AND REVIEWS.

Mr. W. H. Harrington describes in the April number of "The Canadian Entomologist" six new Ottawa *Proctotrypidæ*.

Mr. W. C. McCalla, St. Catharines, Ont., a member of the Club, goes to the National Park at Banff in June, for the purpose of making a complete collection of the plants of that region. These will be sold in sets at the usual price when he returns.

In his "Notes on some Mammals from Black Bay, Labrador" published in the "Proceedings of the New England Zoological Club," Mr. Outram Bangs describes a new jumping mouse, a new muskrat, a new woodchuck and a new shrew. Mr. Doane, who has been collecting in Labrador for the Bangs collection, will remain there for several years working from south to north. His 1898 collection was made on the Straits of Belle Isle.

The principal articles in the recently published "Bulletin of the Natural History Society of New Brunswick" (No. XVII Vol. IV—Pt. II) are "Notes of a Wild Garden" by G. U. Hay, "The Butterflies of New Brunswick" by William McIntosh, and "Notes on the Natural History and Physiography of New Brunswick" by Dr. W. F. Gonong. Other articles of less importance bring the number of pages up to 94 making this part one of the best yet issued by the society.

SPRING EXCURSIONS.

The April sub-excursions proved so successful notwithstanding the lateness of the spring that similar outings have been arranged for May. They will be to Aylmer, May 6th, Rockcliffe, May 13th, and to Beaver Meadow, Hull, May 20th. The first general excursion of the season will be to Chelsea on May 27th.

Subscriptions for 1899 are now due and may be paid to the Treasurer or any member of the Council.

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No. 3.

OTTAWA COLEOPTERA—CERAMBYCIDÆ.

By W. HAGUE HARRINGTON, F.R.S.C.

A list of one thousand Ottawa Coleoptera was published in Transactions, Vol. II, pp. 67-85, 1884, but the number of species now known is probably nearly 50 per cent greater. The majority of the additions, however, have been of small or inconspicuous beetles, or of those belonging to groups which require special methods of collecting. In view of the more extended knowledge of our fauna, it is proposed to offer from time to time lists of the families which appear to be most fully determined. The Cerambycidæ have been selected for the first paper of the series, as in the fifteen years which have elapsed but few changes or additions have been made; the number has only increased from 106 to 113, and but few additional species are likely to be found here.

The Cerambycidæ, or Longicorn Beetles, are always favorites with Coleopterists as they vary remarkably in size, structure and ornamentation, and include many very beautiful insects. Our species do not equal either in size or decoration those of more tropical climates, nor even such beetles as *Ergates spiculatus* Lec. and *Rosalia funebris* Mots. which occur in British Columbia, but we have still some large and handsome forms. The Cerambycids are also of special interest from the fact that, in the larval stage, they subsist invariably upon the woody tissues of plants, and that many of the species are, therefore, included among injurious insects. These, however, are such as attack the trees and shrubs of which man desires to appropriate to his own uses the fruit or other products, or which he plants for shade or ornament. Apart from such economic considerations, the work performed by these wood-eating insects contributes largely to

the removal of dead and fallen timber, and to its replacement by a fresh growth. Comparatively few of the species, probably, attack perfectly vigorous plants, but the injured, dead and fallen individuals are soon thoroughly infested. The eggs laid in crevices of the bark, or in incisions made specially therein, soon produce the grubs which, burrowing first in the juicy outer layer beneath the bark, gradually, as they increase in size, penetrate deeper into the wood, and before they reach maturity many of the species bore long tunnels deep into the trunks even of large trees. These tunnels receive and retain moisture and in them fungi find a foothold, and they thus become centres of disintegration and decay.

In the classification of the Coleoptera of North America, by Leconte and Horn, three subfamilies are recognized and are separated as follows :

Frothorax margined, labrum connate.

PRIONINÆ.

Prothorax not margined, labrum free.

Front tibiæ not grooved.

CERAMBYCINÆ.

Front tibiæ grooved.

LAMIINÆ

Of the PRIONINÆ we have only two representatives, viz. *Orthosoma brunneum* Forst. and *Tragosoma Harrisii* Lec. The former is slightly the largest, attaining a length of 1.5 inches. It is a smooth, brownish beetle with stout antennæ, and the short thorax is armed on each side with three teeth. *T. Harrisii*, while hardly so long, is broader and more robust, darker in colour and with densely hairy thorax and striated elytra. These beetles both infest pine, although the grubs of the former at least are occasionally found in other trees.

The second sub-family, CERAMBYCINÆ, contains the majority of our species, although many of its tribes are not represented in our fauna.

Tribe I, Asemini, is represented by three genera, *Aseum*, *Criocephalus* and *Tetropium*, each represented by one species.

These are rather softish beetles of dull black or brownish colour, infesting pines, and probably other conifers. *Tetropium* can be readily recognized by the divided eyes.

Tribe II, Callidiini, has seven genera represented; the eleven

species being of medium or small size. The most conspicuous is *Physocnemum brevilineum* Say, a handsome beetle over one half of an inch long; the thorax is globular, with a conical protruberance on each side near base; the general colour is black, but the elytra are varied centrally with brown and have several short ivory-white lines; the thighs are very conspicuously swollen, as in many insects of this group. The last genus *Callidium* contains two fairly common species of broader shape; the larger, *C. antennatum* Newm., half an inch long, is a fine purplish blue; the smaller, *C. janthinum* Lec., from one-quarter to two-fifths of an inch long, is a bright bronze-green, or occasionally bronze.

Tribe III. Cerambycini is here represented by the solitary genus *Elaphidion* with two species considered by some authorities identical. These are cylindrical beetles, reddish or brownish, and more or less clothed or mottled with pale pubescence. These beetles are known as Oak-pruners, because the grubs which live in the twigs and branches of the oaks so form their burrows as to cause the portion of the limb in which one lives to break off and drop to the ground in autumn; the beetle emerging the following season.

Tribe IV, Obriini, is represented by three species belonging to as many genera. *Obrium rubrum* Newm. is a delicate yellowish-red beetle about one-fourth of an inch long. *Morlorchus bimaculatus* Say and *Callimoxys sanguinicollis* Oliv. are readily recognized by their abbreviated elytra; the latter is the larger and usually has a red thorax.

Tribe IX, Trachyderini, contains here only *Purpuricenus humeralis* Fab., which is one of our handsomest beetles. It is nearly three-fourths of an inch long; colour rich velvety black, with a triangular vivid red patch on the shoulder of each elytron.

Tribe XI, Clytini, represented by nine genera with thirteen species, contains some of our finest longicorns. The most conspicuous is *Plagionotus speciosus* Say, a well-known Maple-borer. This fine insect is about an inch long and of robust shape;

rich black with bright yellow markings ; one of the yellow bands across the elytra is shaped like a W ; the legs are also yellow but the antennæ are black. When flying this beetle much resembles a big wasp and I have seen persons, near whom one has happened to circle in its flight, very much afraid of being stung by it. *Calloides nobilis* Say is almost as big, but is more sombre in appearance, being entirely black, except the markings on elytra, which sometimes are reduced to a few yellow spots. *Cyllene robinie* Forst., slightly smaller, is a very wasp-like looking species with numerous transverse yellow bands, and red legs and antennæ. It is one of our most obnoxious cerambycids, as its grubs bore and tunnel in the Locust-trees to such an extent as to have killed nearly all such trees in the city. Arhopalus, Xylotrechus, Neoclytus and Clytanthus contain species of moderate size with more elongated thorax, and more cylindrical in shape. They are generally more or less banded with white or yellow. Microclytus, Cyrtophorus and Eudercus are somewhat ant-like in form, especially the second, whose representative, *C. verrucosus* is a common species.

Tribe XIII, Atimiini, has one representative of rare occurrence, viz. *Atimia confusa* Say, a pale brownish beetle about one-third of an inch long, mottled with pale pubescence.

Tribe XV. Desmocerini, has as its representative here *Desmocerus palliatus* Forst., perhaps the most brilliant of our longhorns, although, unfortunately, it loses in the cabinet a certain degree of its beauty by fading. When sunning itself upon the elder-bushes in midsummer it is a very striking and beautiful insect. Its general colour varies from a rich purplish-blue to steel-blue, and a broad yellow band across the base of the elytra gives to it the appropriate name of the Cloaked Beetle.

Tribe XVII, Encyclopini, contains one slender bluish species, *E. cæruleus* Say, which is very rare in this locality.

Tribe XVIII, Lepturini, is the one best represented, as we have ten genera with thirty species. These are usually of moderate size, and none are very small. *Rhagium lineatum* Oliv. differs from most of our cerambycids in having the antennæ quite short,

reaching only to the base of the wing-covers. It is a greyish beetle, rather stoutly built, with costate elytra and a spine on each side of the thorax. The most attractive species is *Anthophilax malachiticus* Hald., of a brilliant green. It is usually very rare, but Dr. Fletcher had the good luck to capture five examples one day last summer, and stray individuals have been taken on other occasions at Buckingham and Chelsea. Another pretty green beetle, smaller and more highly polished, is *Gaurotes cyanipennis* Say, which is at times quite common. The majority of our species belong to the genus *Leptura*, some of which are prettily banded with yellow, or otherwise ornamented. A common species is *L. canadensis* Fab., which is black with red shoulders. The forms of this species with all red or all black elytra (*erythroptera* and *cribrata*) have not yet been found here. One of our largest and most abundant species is *L. proxima* Say, a robust black beetle with yellow elytra tipped with black. *L. chrysocoma* Kirby is smaller and easily distinguished by its golden pubescence.

Our remaining forty odd species belong to the sub-family LAMIINÆ, in which again we find many tribes unrepresented in our fauna.

Tribe V, Psenocerini, contains only one species, *Psenocerus supernotatus* Say, a little cylindrical brownish beetle, with four oblique white marks on elytra, it varies in length from one-tenth to one-fourth of an inch; its larvæ feed in the stems of currant-bushes, etc., and it is known as the American currant-borer.

Tribe VI, Monohammi, is represented by three genera with seven species. Of the four species of *Monohammus* which infest our pines, *M. confusor* Kirby, is probably familiar to all Ottawa citizens, and it is sometimes referred to as the "Ottawa Cow." It is over an inch long, and while the antennæ of the female are not much longer than the body, those of the male reach the length of three inches. These long antennæ and the long legs make of one of these beetles a very conspicuous object. This species is very destructive to pine timber or logs; the grubs being very large and with their powerful jaws bur-

rowing rapidly through the wood. On a still day, in the vicinity of logs infested by these grubs, one can hear at a considerable distance the noise they make in driving their tunnels. *M. scutellatus* Say, a smaller black species, is also very common and destructive. *Goes pulverulenta* Hald. is a fine brownish beetle, with sparse whitish pubescence, of which I have beaten a few specimens from hickory. *G. oculata* Lec. is much smaller and has a black spot on each elytron.

Tribe VII, Acanthoderini, offers seven genera with fifteen species, principally small insects of rather flattened appearance and with long slender antennæ. Their general colour is greyish, varied with markings or tufts of white or dark pubescence. None of the species are so conspicuous as to attract attention from non-entomologists.

Tribe IX, Pogonocheri, is represented by three genera with six species which are also all rather small and inconspicuous, though showing somewhat more variety in their colour and decoration.

Tribe XIV, Saperdini, has only one genus, but this contains ten species, including some of our most important longicorns. *Saperda calcarata* Say, fully an inch long and prettily mottled with yellowish pubescence, is known as the Poplar-borer. *S. candida* Fab., with two bold longitudinal white stripes, is the Apple-borer so destructive in some parts of America, but which here occurs usually on Hawthorn or Shadbush, and, curious to say, seems confined to the Quebec side of the river. *S. vestita* Say, clothed with dense yellowish pubescence and usually with six small black dots on elytra, is the common Basswood-borer. One of the prettiest species is *S. puncticollis* Say, in livery of black and yellow, with four conspicuous black spots on the yellow thorax. This species bores in the stems of Virginia Creeper, and last season Mr. Fletcher obtained numerous specimens and found that the beetles, after emerging from the stems, fed upon the leaves, which they riddled with holes.

Tribe XV, Phytæciini, concludes our series with two genera. *Oberca bimaculata* Oliv., an elongate cylindrical beetle, black with

reddish thorax and short legs, is the well-known Raspberry-girdler. It deposits its eggs in the tops of raspberry canes and causes them to wither and die. Our last beetle, *Tetraopes tetraophthalmus* Forst., has a name whose pronunciation might form a good test of a man's sobriety. It is a bright red beetle with black legs and antennæ, and with four black spots on thorax and six on elytra. It occurs abundantly upon milk weeds, and its larvæ find their subsistence in these plants. The following species which appeared in my former list have been dropped.

Elaphidion incertum Newm. A mutilated specimen, found in my wood-shed, but as head and thorax are missing its identification is uncertain.

Neoclytus caprea Say. Incorrectly determined specimens of our common *Xylotrechus undulatus* Say.

Leptura abdominalis Hald. A beetle given to Dr. Leconte and doubtfully so named by him; probably a form of *L. plebeja* Rand; or *L. subhamata* Rand.

Monohammus maculosus Hald. Through a clerical error this name was inserted instead of *M. tillator* Fab.

Lepturges facetus Say. The beetles so determined belong to *L. querci* Fitch.

Liopus cinereus Lec. This species is now placed with *L. alpha* Say.

The following species represent the additions made to this family during fifteen years, and a large proportion of them are captures of Mr. W. Simpson.

Rhopalopus sanguinicollis Horn.

Phymatodes amoenus Say.

Xylotrechus quadrimaculatus Hald.

Encyclops cæruleus Say.

Anthophilax malachiticus Hald.

Gaurotes abdominalis Bland.

Typocerus zebratus Fab.

Leptura lineola Say.

Leptura biforis Newm.

Leptura sanguinea Lec.

Leptostylus collaris Hald.

Saperda puncticollis Say.

Although, as previously stated, but few additional species are likely to reward the collector, many of those on the list are so poorly represented in our cabinets that additional material is most desirable. We are also ignorant of the plants attacked by many of these beetles and the life-histories of even the commoner

species are often but poorly known. Records of the trees and shrubs upon which the beetles occur are always valuable, and especially so if it be ascertained that they have emerged from such plants, or if they are bred from them. By carefully examining injured or fallen trees these beetles may often be found, or their larvae and pupæ be obtained. Many species also occur during the summer upon flowering plants, especially trees and shrubs, such as Elder, Sumach, Goldenrod, Spiræa, etc. The smaller species, as well as some of the larger, may be most successfully obtained by using a beating-net under the branches of such trees as they infest. While nearly every tree and shrub is attacked by one or more species, the Maples, White Pine and Hickory are most subject to their depredations.

The following is a catalogue of our species :—

OTTAWA CERAMBYCIDÆ.

1. *Orthosoma brunneum* Forst. Rather common ; infests Pine logs and stumps.
2. *Tragosoma Harrisii* Lec. Rarer ; also infests Pine.
3. *Asemum moestum* Hald. Abundant ; in millyards and about Pine timber.
4. *Criocephalus agrestis* Kirby. Very common ; also a Pine-borer.
5. *Tetropium cinnamopterum* Kirby. Rare ; probably infests conifers.
6. *Gonocallus collaris* Kirby. One specimen.
7. *Physocnemum brevilineum* Say. Not common ; bred by Dr. Fletcher from Elm.
8. *Rhopalopus sanguinicollis* Horn. One taken on Apple at Kingsmere by Mr. Simpson.
9. *Hylotrupes ligneus* Fab. Common ; inhabits the Cedar.
10. *Phymatodes thoracicus* Muls. Several bred one year by Dr. Fletcher from hoops of wine cask ; possibly not native.
11. *Phymatodes amœnus* Say. One specimen received from Dr. Fletcher.
12. *Phymatodes dimidiatus* Kirby. Not common ; occurs upon the White Pine.
13. *Merium proteus* Kirby. Rare here ; appears to be more common northward.
14. *Callidium antennatum* Newm. Rather common ; infests the Pine.
15. *Callidium janthinum* Lec. Less abundant ; is a borer in Cedar.
16. *Callidium æreum* Newm. One specimen, from Dr. Fletcher.
17. *Elaphidion parallelum* Newm. Rare ; this beetle is an Oak-pruner.
18. *Elaphidion villosum* Fab. One specimen. Some authors make this a form of the preceding.

19. *Obrium rubrum* Newm. One on Hickory and one on Scented Raspberry.
20. *Molorchus bimaculatus* Say. Abundant ; infests Hickory and Maple.
21. *Callimoxys sanguinicollis* Oliv. Rare ; no record of habits.
22. *Purpuricenus humeralis* Fab. One female taken on fence under Oak-tree near Rideau Hall and one male picked up on Sparks St. Two specimens have also been taken by Mr. Simpson at Kingsmere.
23. *Cyllene robiniae* Forst. Abundant ; a borer in Acacia and exceedingly destructive to that fine ornamental and shade tree.
24. *Plagionotus speciosus* Say. Not very common ; bores in Maples.
25. *Calloides nobilis* Say. More abundant ; also a borer in Maple.
26. *Arhopalus fulminans* Feb. Rare ; no observation on habits.
27. *Xylotrechus colonus* Fab. Not common ; occurs on dead Hickory.
28. *Xylotrechus sagittatus* Germ. Rare ; probably also infests Hickory.
29. *Xylotrechus quadrimaculatus* Hald. One specimen captured upon Beech.
30. *Xylotrechus undulatus* Say. Abundant ; probably infests Pine and Spruce.
31. *Neoclytus muricatus* Kirby. Two specimens ; one of which was taken upon an old Pine.
32. *Neoclytus erythrocephalus* Fab. Common ; upon felled Hickory, end of July.
33. *Clytanthus ruficola* Oliv. Common ; upon Basswood stumps.
34. *Microclytus gazellula* Hald. One specimen upon Sumach flowers.
35. *Cyrtophorus verrucosus* Oliv. Abundant on flowering shrubs in May and June ; occurs on Oak and Hickory and one was found under bark of Beech.
36. *Eudermes picipes* Fab. Rare ; on Hickory and on Sumach blossoms in July.
37. *Atimia confusa* Say. Rare ; upon White Pine.
38. *Desmocerus palliatus* Forst. Common ; bores in stems of Elder.
39. *Eucyclops caruleus* Say. Very rare ; no record as to habitat.
40. *Rhagium lineatum* Oliv. Not common ; lives under bark of Pine.
41. *Centrodera decolorata* Harr. Two specimens upon Oak. Mr. Simpson has also beetles taken in an orchard at Kingsmere where they occurred in abundance upon Apple.
42. *Toxotus Schaumii* Lec. Two specimens ; one was upon Beech.
43. *Toxotus vittiger* Rand. Common at Casselman upon Oaks in June.
44. *Pachyta monticola* Rand. Not common ; taken upon Elder flowers, etc. in May at Kingsmere and other places in the hills.
45. *Anthophilax malachiticus* Hald. Rare ; seems to occur upon Birch and Beech.
46. *Anthophilax alternatus* Hald. Two specimens ; one in a decaying Beech.
47. *Achmæops proteus* Kirby. Very abundant in Lumber-yards and upon Pine.
48. *Achmæops pratensis* Laich. Also abundant in similar conditions.
49. *Gaurotes cyanipennis* Say. Abundant ; especially on Sumach flowers in July ; infests Butternut.

50. *Gaurotes andominalis* Bland. One specimen captured at Kingsmere by Mr. Simpson; evidently very rare and as far as I know not recorded from Canada.
51. *Bellamira scalaris* Say. Rare; observed ovipositing in Maple Stumps, and also dug from burrow in old poplar log.
52. *Typocerus zebratus* Fab. Common on Goldenrod and *Spiræa* in August.
53. *Typocerus velutinus* Oliv. Abundant on flowering shrubs in early August, and has also been taken upon Hickory.
54. *Leptura plebeja* Rand. Very rare.
55. *Leptura subhamata* Rand. Rare; occurs on Beech and Oak.
56. *Leptura lineola* Say. Four specimens captured at Kingsmere by Mr. Simpson.
57. *Leptura capitata* Newm. Common; on flowers of Spiked-maple, etc.
58. *Leptura exigua* Newm. *Leptura saucia* Lec. of former list. Common; on Sumach and other shrubs in blossom.
59. *Leptura zebra* Oliv. Only three or four specimens.
60. *Leptura sexmaculata* Linn. Rare; on flowers of *Spiræa*, etc.
61. *Leptura nigrella* Say. Rare; habitat unknown.
62. *Leptura canadensis* Fab. Abundant; upon flowering shrubs end of July, especially upon *Spiræa*; one taken upon Ash.
63. *Leptura sanguinea* Lec. Very rare; June, habits unknown.
64. *Leptura chrysocoma* Kirby. Rare; probably infests Hickory and Butternut.
65. *Leptura proxima* Say. Abundant; occurs upon dead Hickory.
66. *Leptura biforis* Newm. One specimen in Mr. Simpson's collection.
67. *Leptura vittata* Germ. Abundant; flowering shrubs in June.
68. *Leptura pubera* Say. Also rather common in June.
69. *Leptura sphaericollis* Say. Only one specimen.
70. *Leptura mutabilis* Newm. Abundant; form with pale elytra the less common.
71. *Psenocerus supernotatus* Say. Common; bred by Dr. Fletcher from Virginia Creeper.
72. *Monohammus titillator* Fab. Not common; formerly taken upon young Pines at Hull quarries.
73. *Monohammus scutellatus* Say. Abundant; destructive to Pine logs and timber.
74. *Monohammus confusor* Kirby. Abundant; the largest and most destructive of our Pine-borers, doing great damage to logs and timber; attacks living as well as dead trees.
75. *Monohammus marmorator* Kirby. Only one male captured here; more common further up the river where there is more Red Pine.
76. *Dorcheschema nigrum* Say. Abundant; upon felled Hickory or old trees in June.
77. *Goes pulverulenta* Hald. Rare; beaten from injured Hickory in July.

78. *Goes ocellata* Lec. Two specimens taken on felled Hickory.
79. *Acanthoderes diciptens* Hald. Not common.
80. *Leptostylus aculiferus* Say. Two specimens; upon Butternut.
81. *Leptostylus parvus* Lec. Very rare; place of capture not recorded.
82. *Leptostylus sexguttatus* Say. *Leptostylus commixtus* Hald. of former list.
Rare. Probably from Hickory.
83. *Leptostylus perplexus* Hald? One specimen; determination doubtful.
84. *Leptostylus macula* Say. Common; June and July; most frequently on Hickory and Butternut, but has been also taken on Maple and Poplar.
85. *Leptostylus collaris* Hald. One specimen; probably from Hickory.
86. *Liopus alpha* Say. *Liopus cinereus* Lec. of former list is now included in this species. Common; on Hickory in midsummer.
87. *Liopus punctatus* Lec. Two specimens; accidental captures.
88. *Lepturges symmetricus* Hald. *Lepturges angulatus* Lec. of former list. No record of habits.
89. *Lepturges signatus* Lec. Very rare. No record of habits.
90. *Lepturges querci* Fitch. *Lepturges facetus* Say of former list belongs to this species. Common; usually on Hickory, one from Willow.
91. *Hyperplatys aspersus* Say. Common; upon Hickory, June and July.
92. *Hyperplatys maculatus* Hald. Common; with preceding, and is probably only a form of *aspersus*.
93. *Graphisurus fasciatus* Deg. Abundant; infests Hickory and Maple.
94. *Acanthocinus obsoletus* Oliv. Also common; occurs with preceding.
95. *Hoplosia nublia* Lec. Rare; June, no record of infestations.
96. *Pogonocherus penicellatus* Lec. Several specimens taken on fences and tree boxes in the city; also one upon dead Pine.
97. *Pogonocherus mixtus* Hald. Not common; no record of infestation.
98. *Eupogonius tomentosus* Hald. One specimen.
99. *Eupogonius vestitus* Say. Two specimens; taken also by Mr. Simpson.
100. *Eupogonius subarmatus* Lec. Rare; on Scented Raspberry and on Ash.
101. *Saperda calcarata* Say. Rare; a destructive borer in Poplars.
102. *Saperda mutica* Say. Rare; on Willow; one pair June and one pair July.
103. *Saperda candida* Fab. Not common; occurs upon Hawthorn, Shad-bush and wild Plum.
104. *Saperda vestita* Say. Abundant; a borer in Basswood.
105. *Saperda discoidea* Fab. Common; June to August on fallen and dead Hickory.
106. *Saperda tridentata* Oliv. Abundant; infests principally the Elm, but also the Maple.
107. *Saperda lateralis* Fab. Two specimens; accidental captures.

108. *Saperda puncticollis* Say. Rare ; bores in stems of Virginia Creeper.
109. *Saperda mœsta* Lec. Common ; Poplars often badly disfigured by the gall-like swellings caused by the larvae infesting the branches.
110. *Saperda concolor* Lec. One specimen. Habits not recorded.
111. *Oberea bimaculata* Oliv. Not common ; infests Raspberries. The female girdling the canes when ovipositing, and the larvæ boring in canes.
112. *Oberea tripunctata* Swed. *Oberea amabilis* Hald. of former list. Common ; upon Goldenrod and probably boring in that plant.
113. *Tetraopes tetraophthalmus* Forst. Abundant ; upon Milkweed, in the base of which the larvae subsist.

ON REPTILIAN REMAINS FROM THE CRETACEOUS OF NORTH-WESTERN CANADA.

By LAWRENCE M. LAMBE, F.G.S.

The collection of fossils made by the writer during the summers of 1897 and 1898 from the Cretaceous rocks of the Red Deer River, in the Districts of Alberta and Assiniboia, consist principally of dinosaurian remains, but include also the remains of turtles and crocodiles as well as a few fish vertebræ and scales, leaves and silicified wood.*

The rocks exposed along the Red Deer River are those of the Belly River, Pierre and Laramie formations, but by far the larger number of fossils were secured from the Belly River beds which are especially interesting as representing a terrestrial fauna separated from that of the Laramie by the thick marine beds of the Pierre.

Taking into consideration the reptilian remains only, it is found that they represent the three orders *Chelonia*, *Crocodylia* and *Dinosauria*.

I. The following provisional enumeration may be made of the fossils from the Belly River formation :—

1. *Chelonia*—

Plastomenus coalescens, Cope. Parts of the dorsal and ventral shields.

*Vide Summary Report of the Geological Survey Department for 1898.

Also fragments of shell that may represent other species, as well as vertebræ, terminal phalanges and numerous other bones of the endoskeleton of turtles.

Besides the above, small pieces of the plastron of *P. coalescens* were collected in 1882 by Mr. R. G. McConnell from the Belly River beds of this district.

2. Crocodilia—

Portions of the rami of mandibles of a species of *Botrosaurus*, Agassiz, probably *B. perrugosus* described by Cope from the Fort Union (Laramie) group of Colorado.

3. Dinosauria—

a. Trachodon mirabilis, Leidy. Numerous maxillæ and rami of mandibles, in some cases with the teeth particularly well preserved, as well as a large number of the principal bones of this species.

Near the mouth of Berry Creek a large horn-core, one foot long and nearly five inches in diameter at the base to which a small part of the skull remained attached, was found with parts of a maxilla holding teeth of the *Trachodon* type. The horn-core is asymmetrical, and suggests the presence of a pair of well developed horns in the species of *Trachodon* here represented, probably that of *T. mirabilis*, Leidy, which with its allies have been supposed to be hornless.

b. A maxilla with teeth, a separate tooth and a right ramus, of a species of *Triceratops*, Marsh.

c. Separate teeth and terminal phalanges of *Laelaps incrasatus*, Cope.

d. The upper part of the cranium and a number of dermal plates of a species of *Nodosaurus*, probably *N. textilis*, Marsh.

II. The more important specimens from the Laramie series consist almost entirely of dinosaurian remains and are more fragmentary and not so numerous as those from the Belly River beds:—

1. The order *Chelonia* is not represented in the collections from the Laramie of this district, but fragments of a plastron, probably referable to *Plastomenus coalescens*, Cope, were found in

1881 by Dr. G. M. Dawson in the Willow Creek (Laramie) beds of the Oldman River, Alberta.

2. No crocodilian remains were found.

3. Dinosauria—

a. Most of the dinosaurian bones are thought to belong to *Trachodon mirabilis*.

In 1881 Mr. T. C. Weston secured fragments of jaw with teeth, of *Trachodon mirabilis*, from the Laramie of the Red Deer River, and in 1882 Mr. R. G. McConnell obtained a well preserved femur, from the Laramie of Scabby Butte, Alberta, that appears to belong to the same species.

b. Other dinosaurian remains from the Laramie of the Red Deer River in the collection of the Survey are a skull of *Laelaps incrassatus*, Cope, found by Mr. J. B. Tyrrell in 1884, and another skull of the same species collected in 1889 by Mr. Weston.

From a comparison of the reptilian remains from the Belly River beds with those from the Laramie, it would appear that there are three species common to both formations, *viz.*, *Plastomenus coalescens*, Cope, *Trachodon mirabilis*, Leidy, and *Laelaps incrassatus*, Cope, also that these are the three forms most abundantly represented in the collection. Remains of *P. coalescens* seem to be not uncommon in both formations, those of *T. mirabilis* are abundant in the Belly River rocks but are not often met with in the Laramie whilst the reverse is the case with those of *L. incrassatus*.

The similarity in the vertebrate faunæ of the Belly River and Laramie formations suggested by the above comparison is also apparent in the invertebrate faunæ of the same formations, from which it may reasonably be inferred that the conditions of life following the deposition of the marine beds of the Pierre were essentially the same as those that preceded it.

THE BERMUDA OR EASTER LILY.

By H. B. SMALL.

Few people have any idea of the enormous extent to which the cultivation of the Easter Lily is carried on the islands of Bermuda. Acres upon acres are devoted to this plant alone, and its bulbs constitute one of the principal and most lucrative exports of those islands. The beautiful sight which one of the lily fields presents when in full bloom is beyond description, and the fragrance that loads the air is oppressive. For decorative purposes the buds are cut shortly before Easter before the flower opens, and carefully packed with damp moss in boxes the sides of which by means of cleats allow ventilation. These on arrival in New York are immediately distributed to the points whence applications have been received, and if too backward are forced into bloom by placing the stems in warm water. But the flowers form only a small part of the profit attending lily culture. The bulbs are shipped in enormous quantities to wholesale florists, who supply the demand for them all over the continent. This industry only commenced in 1878, when an American named Harris, making a study of the plant and its growth introduced it into Bermuda, and from the success attending its culture there, it received the name by which it is now known *Lilium Harrisii*, the developement of flowers under the genial climate and adaptability of the soil making it supercede the original lily known as *L. longiflorum*.

The industry has of late years been seriously threatened by the ravages of the *Eucharis* Mite which has so deteriorated the bulbs that their sale is seriously injured. The disease is characterized by spotting and distortion of the leaves and flowers, and a stunted growth. The Department of Agriculture in Washington has made a special study of it, and in August 1897 issued a bulletin thereon. Various remedies have been tried, but so far without effect, and application was made to England last year for an expert from Kew to visit Bermuda and examine the whole condition and nature of the disease. The lily is supposed

to have been originally brought from China, and a curious legend respecting it, not generally known may prove of interest. It is as follows :--

Centuries before the Christian era, great calamities befell the Chinese Empire, and the prime minister was threatened by the Emperor with the loss of his head unless he devised a means of averting the wrath of the gods. Asserting that it had been revealed to him in a dream to make a sacrifice of men, women and fruits in a far off island where the gods made their abode, a vessel was placed at his disposal in which were collected 100 of the strongest young men and fairest maidens, together with the finest fruits. Amongst the stores was the "Bak-hap" which translated means the "Lily of the 100 fields." It was esteemed a sweet and dainty morsel, and an especial delicacy. The vessel sailed away, and this was the last the Emperor heard of his prime minister, who, however, when once on the voyage intimated to youths and maidens that instead of being sacrificed they would inhabit and populate the beautiful island he knew of, one of the islands of Japan. They willingly agreed to this, and in due course of events, by reason of the change of soil the "Bak-hap" gradually assumed greater height and strength and a more luxuriant bloom. As it improved in beauty it became less useful as an article of food, and as strong taste had developed for refinement and art in the new colony, its use as an article of food was abandoned. Hundreds of years rolled on and the island became a land of floriculture. The "Bak-hap" grew steadily in beauty and was finally exported to Europe as a new garden flower, until an American noticing its splendour secured some of bulbs, and being interested in the Bermudas introduced it there where it seems to have made its home.

ORNITHOLOGY.

Edited by W. T. MACOUN.

BIRD NOTES FOR APRIL AND MAY.

From the long list of birds which have been recorded during the past month it is very apparent that some members of THE OTTAWA FIELD NATURALISTS' CLUB have not been idle. It is unfortunate, however, that so few of us take the time, or make the opportunity, to study the habits of our birds and record observations. The members of the Club should feel grateful to the few who send their notes for publication, and who, in this way, perhaps, may cause others to learn more about birds.

It is interesting to compare the dates of arrival of birds recorded in this number with those in the June number for 1898, up to the 14th May last year, the arrival of 81 birds have been recorded and up to the 14th May this year 77 birds have been noted. On the whole, during the past month the birds have arrived on nearly the same date as last year, there being a few exceptions, however, where there was more than a week's difference; in some cases the bird having been recorded earlier and in some cases later this year.

1899.

- Apr. 13—RUBY THROATED HUMMINGBIRD, *Trochilus colubris*. Miss Harmer.
 14—BLACK DUCK, *Anas obscura*. Mr. C. H. Young.
 14—MEADOWLARK, *Sturnella magna*. Mr. C. H. Young; April 15th. Mr. W. A. D. Lees.
 15—SNOWFLAKE, *Plectrophenax nivalis*. Large flock. Mr. W. A. D. Lees.
 15—BELTED KINGFISHER, *Ceryle alcyon*. Mr. W. A. D. Lees; April 16th, Mr. Geo. R. White.
 15—WHITE-RUMPED SHRIKE, *Lanius ludovicianus excubitorides*. Miss Harmer.
 15—COW-BIRD, *Molothrus ater*. Mr. Geo. R. White; April 17th, Mr. C. H. Young.
 15—RUSTY BLACKBIRD, *Scolecophagus carolinus*. Mr. Geo. R. White.
 16—GREAT BLUE HERON, *Ardea herodias*. Mr. Young.
 16—VESPER SPARROW, *Poocates gramineus*. Dr. J. Fletcher. Fairly common at Experimental Farm, April 21.

- 17—AMERICAN ROUGH-LEGGED HAWK, *Archibuteo lagopus sancti-johannis*. Mr. Young.
- 18—HERMIT THRUSH, *Turdus aonalaschkae pallasi*. Mr. White.
- 18—CHIPPING SPARROW, *Spizella socialis*. Mr. White ; April 19, Mr. Lees.
- 19—FLICKER, *Colaptes auratus*. Mr. Lees, Mr. White ; April 20th, Mr. Young.
- 19—WHITE-BREASTED NUTHATCH, *Sitta carolinensis*. Mr. Lees.
- 20—SAVANNAH SPARROW, *Ammodramus sandwichensis*. Mr. Lees.
- 22—WILSON'S SNIPE, *Gallinago delicata*. Mr. Lees, at Russell.
- 22—PURPLE MARTIN, *Progne subis*. Mr. Lees.
- 22—CANADA GOOSE, *Branta canadensis*. Mr. Lees. Large flocks over Experimental Farm, Mr. W. T. Macoun.
- 23—MARSH HAWK, *Circus hudsonius*, Mr. Young.
- 23—BANK SWALLOW, *Clivicola riparia*. Mr. Lees.
- 23—TREE SWALLOW, *Tachycineta bicolor*. Mr. Lees.
- 23—PILEATED WOODPECKER, *Ceophloeus pileatus*. Mr. Young.
- 23—AMERICAN OSPREY, *Pandion haliaetus carolinensis*. Mr. White, Mr. Young.
- 26—LOON, *Urinator imber*. Mr. White.
- 28—BARN SWALLOW, *Chelidon erythrogaster*. Mr. W. T. Macoun ; April 29th, Mr. Lees.
- 29—AMERICAN HERRING GULL, *Larus argentatus smithsonianus*. Mr. Lees.
- 30—BROWN THRASHER, *Harporhynchus rufus*. Mr. W. T. Macoun.
- 30—HOUSE WREN, *Troglodytes aedon*. Mr. Lees.
- 30—SPOTTED SANDPIPER, *Actitis macularia*. Mr. White, Mr. Lees.
- 30—AMERICAN BITTERN, *Botaurus lentiginosus*. Mr. Lees, Mr. White.
- 30—HOODED MERGANSER, *Lophodytes cucullatus*. Mr. White.
- 30—KILLDEER, *Aegialitis vocifera*. Mr. White.
- 30—PECTORAL SANDPIPER, *Tringa maculata*. Mr. Lees.
- May 1—LEAST FLYCATCHER, *Empidonax minimus*. Mr. Lees.
- 1—WHITE-THROATED SPARROW, *Zonotrichia albicollis*. Dr. Fletcher ; May 2nd, Mr. White.
- 2—CHIMNEY SWIFT, *Chaetura pelagica*. Mr. White, Mr. Lees ; May 4th, Miss Harmer.
- 2—YELLOW WARBLER, *Dendroica aestiva*. Miss Harmer ; May 3rd, Mr. Lees.
- 3—WARBLING VIREO, *Vireo gilvus*. Mr. Lees.
- 4—WOOD THRUSH, *Turdus mustelinus*. Mr. Young.
- 4—BALTIMORE ORIOLE, *Icterus galbula*. Mr. White.
- 5—KINGBIRD, *Tyrannus tyrannus*. Mr. Young ; May 6th, Mr. White.
- 6—MYRTLE WARBLER, *Dendroica coronata*. Mr. White.

- 6—CLIFF SWALLOW, *Petrochelidon lunifrons*. Mr. White.
 6—WOOD DUCK, *Aix sponsa*. Mr. White.
 7—GREATER YELLOW-LEGS, *Totanus melanoleucus*. Mr. White.
 7—MALLARD, *Anas boschas*. Mr. White.
 11—BLACK-BILLED CUCKOO, *Coccyzus erythrophthalmus*. Mr. White.
 11—CATBIRD, *Galeoscoptes carolinensis*. Mr. White.
 11—WHITE-CROWNED SPARROW, *Zonotrichia leucophrys*. Miss Harmer.
 11—CRESTED FLYCATCHER, *Myiarchus crinitus*. Mr. White; May 13th,
 Mr. Lees.
 12—SCARLET TANAGER, *Piranga erythromelas*. Mr. White.
 13—BOBOLINK, *Dolichonyx oryzivorus*. Mr. Lees.
 13—BLACK AND WHITE WARBLER, *Mniotilta varia*. Mr. Lees.
 13—AMERICAN REDSTART, *Setophaga ruticilla*. Mr. Lees.
 13—OVEN-BIRD, *Seiurus aurocapillus*. Ms. Lees.
 13—AMERICAN PIPIT, *Anthus pensilvanicus*. [Mr. Lees; May 14th, Mr.
 White.
 13—SWAMP SPARROW, *Melospiza georgiana*. Mr. Lees.
 13—RED-EYED VIREO, *Vireo olivaceus*. Mr. Lees; May 14th, Mr. White.
 13—RED-HEADED WOODPECKER, *Melanerpes erythrocephalus*. Mr. Lees.
 14—CHESNUT-SIDED WARBLER, *Dendroica pensylvanica*. Mr. White.
 14—ROSE-BREADED GROSBEAK, *Habia ludoviciana*. Mr. White.
 14—BLUE-HEADED VIREO, *Vireo solitarius*. Mr. White.

BOTANICAL NOTES.

Edited by DR. JAMES FLETCHER.

RIBES CILIOSUM.—I have received from Mr. C. D. Moggridge of Belle Meade Farm, Hazelmere, B. C., specimens of the flowering shoots of the above named Ribes, which has been kindly named for me by Prof. Macoun. This is a very rare plant, as far as we yet know, in British Columbia. It was described in the "Flora of Northwest America" by Thos. Howell, Vol. 1, page 208, Apr. 1st. 1898. Prof. Macoun has had specimens of this species for sometime in the Herbarium of the National Museum, collected by Mr. J. M. Macoun in 1889 at Burnaby Lake, B. C., and had them separated as an undescribed species until Mr. Howell's description appeared. The following interesting particulars about the habitat of *Ribes ciliosum* are

given by Mr. Moggridge. "I am sending you by this mail a bunch of cuttings and some rooted layers of the *Ribes* you ask for. The layers will give you a fair idea of the way the plant spreads. I only know of one locality where it grows near here, and that is only a few square yards in extent. I am watching over it carefully. The plant grows on a small island, just above flood level, apparently almost smothered by Salmon-berry (*Rubus spectabilis*), the Red-berried Elder, etc., which cover the ground. It does not attempt to grow to the light. I have not seen it more than 2 or 3 feet from the ground. Its long straggling branches trail along as near to the soil as they can get, sometimes running under ground for a couple of feet, where they take root, and then emerging again start new bushes. The small clusters of dark brown, wide-open flowers with very short tubes are broader than deep and borne on very short foot-stalks. They grow on last year's wood, a shoot about six inches long from a bud on the older wood. The cuttings I send are from the terminal shoots which are much stronger. The berries, of which I have only found a few, look like an undersized red currant but are very acrid in taste. The leaves are heart-shaped, nearly two inches across with three large lobes and sometimes the lower large lobes are divided in the middle, the leaves are sharply toothed and the petioles are fringed with a few long bristles. There are about six or eight flowers in each raceme."

The habit of this western currant is apparently very similar to that of *Ribes prostratum* and may possibly have been confounded with that species in British Columbia. J. F.

ELEOCHARIS MACOUNII.—While collecting Potamogetons in Johnson's Lake near North Wakefield in September, 1894, I found on the border of a marsh near that lake an *Eleocharis* unknown to me growing in company with *E. obtusa* and *E. intermedia*. It has recently been described as a new species by Mr. M. L. Fernald.* As pointed out by Mr. Fernald this plant in its dark elongated heads more nearly resembles the European *E. carniolica* than the American *E. intermedia*. He thus describes it: Annual: culms slender, weak, the longest 2 or 2.5

cm. long : heads elliptic-lanceolate, about 1 cm. long, more densely flowered than in *E. intermedia*, the ovate-lanceolate or oblong-lanceolate acutish or blunt scales dark brown : achene much compressed, obscurely triangular in cross-section, obovate, less elongated than that of *E. intermedia* ; the deltoid-conical tubercle nearly as broad and one-half as high as the body of the achene.

J. M. M.

* Proceeding of the American Academy of Arts and Sciences Vol. XXXIV, p. 487.

LYCOPODIUM INUNDATUM.—On the wet bank near the junction of the Canada Atlantic Railway and the Rockland Branch at South Indian, May 9th, 1899. An addition to the local flora and not before recorded in Eastern Ontario. J. M.

SYMPLOCARPUS FÆTIDUS.—Abundant in a swamp about one mile from Osgoode. Collected by Mr. R. H. Cowley early in May. Not before collected in the Ottawa District.

TRILLIUM GRANDIFLORUM.—On May 13th, Mrs. A. E. Barlow collected a monstrosity of this species with four leaves, four sepals, four petals, eight stamens and four pistils. Two stems rose from the one rootstalk, each bearing exceptionally large flowers with the above characters). The plant is preserved in the herbarium of the Geological Survey.

A GUIDE TO WILD FLOWERS.

While in England almost every educated man and woman and nearly every child outside large cities knows the names of the common flowers of wood and roadside, meadow and field, in America such knowledge has been until very lately comparatively rare. A dozen or so of spring species are familiar to everyone and a like number of the more conspicuous and common summer flowers are pretty well known, but a general acquaintance with even two or three hundred species is quite enough to secure from the multitude the title of "botanist." There are many reasons for this lamentable ignorance but chief among them has been the lack of popular books on flowers. An

entirely unfounded but very general belief that special scientific training is essential before one may begin the study of plants has deterred many a lover of flowers from attempting to learn the names of species with which he has been familiar from childhood.

In recent years, however, several books of a more or less popular character have been published and their effect is already noticeable in the increased interest that is being taken in the study of flowers. Mrs. Trail's "Plant Life in Canada" was one of the first, as it is still one of the best, books of this kind published in America. It is, however, more a record of the author's own observations, than an aid to the study of plants and has perhaps for that reason not had so large a sale as its literary quality and the information it contains merit. "How to know the Wild Flowers," by Mrs. Dana, and a more recent book by the same author "How to know Ferns" have had a large sale in Ottawa and are doing much to popularize Botany.

The latest and most attractive book on flowers is Miss Lounsberry's "A Guide to Wild Flowers" illustrated with sixty-four coloured and one hundred black-and-white plates. In Mrs. Dana's book the usual general key to genera gives place to an artificial arrangement by means of which flowers of one colour are grouped together in of their date of blooming; Miss Lounsberry has adopted a new arrangement and has divided the species included in her book into eight groups according to their habitat. Plants growing in water are first described, then those growing in mud and so on until the uplands are reached. Though some difficulty must have been experienced in determining the group into which some species of general distribution should be put, the author seems, to have been able to place each species just where one would expect to find it and the arrangement she has adopted will enable many who know nothing of botany to name the common plants met with in their rambles.

As should be the case with books of this kind, the common English names are given first in heavy type, then follows the Latin name, below which comes in a single line the family, colour,

odour, range and time of bloom. A brief technical description of the plant is followed by general descriptive notes, which cannot fail to interest every lover of flowers. The special feature of the book, however, is the beautiful coloured plants, which make it the most attractive book of its kind published at a small price. Mrs. Rowan, by whom the drawings were made, is apparently more of an artist than a botanist and while all the illustrations are artistically drawn and beautifully coloured all are not equally true to nature; nor are the drawings in black-and-white always as accurate as one could wish. It is perhaps too much to expect perfection in a book of this kind and its merits far outweigh its inaccuracies. As it will be used principally by those who will be satisfied to learn the English names of the plants they see the adoption of the nomenclature and arrangement of Britton and Brown's *Flora* detracts little from the work, though for a popular book the names and arrangement of Gray's *Manual* would have been preferable, if for no other reason than that they are more familiar.

J. M. M.

AFTERNOON LECTURES.

During April and May a course of popular lectures on scientific subjects was delivered in the Assembly Room of the Normal School by members of the Club. The attendance at all these lectures was large, an evidence that there is no lack of interest in Ottawa in subjects of this kind.

I. APRIL, 10th—"POINTS OF INTEREST IN THE GEOLOGY OF OTTAWA" by Dr. H. M. Ami.—In dealing with his subject Dr. Ami referred to the various geological formations to be found in this district and pointed out the various places where each formation could be studied to advantage—what were the mineral characters of each, the nature, origin, and mode of formation or deposition of each series together with the various fossil organic remains or extinct types of animal life which were to be found in great profusion in many of the sedimentary strata of Ottawa. The speaker

practically took his audience to a series of excursions about Ottawa and pointed out by means of maps, charts, diagrams, photographs and specimens the most salient and important geological features to be observed and studied.

2. APRIL 17th—"THE STUDY OF BIRDS," by Mr. A. G. Kingston.—The lecturer directed attention to the recognized value of all nature studies in inducing a healthy natural growth in three directions—the memory, the reason, the sentimental faculties. In respect of influence upon the latter especially, he claimed that Field Ornithology was easily first of all branches of Natural History.

The appliances and qualities requisite for the intending student of this subject were then enumerated. The lecturer deprecated the making by the ordinary student of a large collection of bird-skins, but advised that more attention should be paid to the manners and habits of the living bird as seen in the field. For a first season's work he thought it would be wise for a beginner to confine himself entirely to the land birds, of which there were on the Ottawa list, (excluding casual or accidental visitants) about 125 species.

The student having furnished himself with a good descriptive hand-book, should mark therein all species known to occur in this district. Practical instructions were then given for noting the important characters of a bird as they appear to an observer in the field; and a field key to the families was placed upon the black-board, by the use of which in conjunction with the descriptive hand-book the lecturer believed it possible to identify almost any of the land birds of the district. It was then pointed out that identification of species was not to be regarded as an end in itself but only as an opening of acquaintanceship with each bird, to be followed by gaining a knowledge of its habits, song, migration, and many an interesting problem so to be opened up.

Space does not permit the inclusion of the Field Key to the families in this report but it is intended to publish it in the next number of the Naturalist.

3. APRIL, 24th.--"ENTOMOLOGY," by Dr. James Fletcher, Dominion Entomologist.—The speaker without preliminary introduction went right to the heart of his subject by asking and answering shortly what is Entomology? What is an insect? He deprecated the indiscriminate use of the word "bug" as generally used because although all bugs were insects all insects were by no means bugs. Insects are amongst the most familiar of natural objects. They are met with in all climates and in one or other form at all seasons of the year. It was estimated that they comprised four-fifths of the animal kingdom; no less than 200,000 species being found in collections. Their place in the classification of the animal kingdom was noted and the differences between the members of the seven great orders explained. This old classification of the insects was recommended for beginners and the derivation of the names used explained. Diagrams illustrating the different kinds of insects were shown. An earnest plea was made for a more extensive study of insects on account of the utility of the knowledge obtained, first as a means of preventing the great losses which annually occurred among crops, then as a useful means of training the mind in habits of accuracy, of observation and precision of description and, lastly, as an unfailing and constant source of intellectual pleasure. It was advised to study a few things well—e.g. a single order or even a single insect, rather than to aim at amassing a large collection, the thorough study of which was rendered impossible by the shortness of the average life of man. Beginners were encouraged to make use of the leaders of the club. The delight of rearing even one of our commonest butterflies from the egg through the larval stages to the chrysalis and then to the perfect insect were graphically described and all present were urged to make at least one trial during the coming season. The speaker felt sure that if this were done many who had previously seen no particular beauties in insects would be surprised at the amount of pleasure they would derive and the unexpected beauties they would discern in the exquisite perfection of every smallest part of every insect they examined.

The address began at quarter past four and ended punctually at 5:15.

4. MAY, 1st.—“SHELLS,” by F. R. Latchford.—The place in nature occupied by shells and their builders, was pointed out, and the classes indicated in which shells have been divided by naturalists. The number, diversity and beauty of the different families were alluded to, and special reference was made to the land and fresh water species found in Canada—particularly those occurring within the sphere of the Club's operations. The best collecting grounds in the vicinity of Ottawa were specified. The sand bars of Duck Island were mentioned as one of the most remarkable stations in Canada for many species of *Unio* of unusual size or beauty. Instructions were given as to the best means of collecting, and the best methods of cleaning, classifying and preserving shells when collected. A comparison was made of the different localities around Ottawa in which shells abound, the great diversity which exists between the shells in stations apparently alike in character, and an earnest plea urged for an increased interest in the study of shells here and in other parts of Canada. In the discussion which followed, Mr. Latchford stated that he would be glad to place a collection of Canadian shells in the Normal school, if facilities were afforded for displaying them to the students.

5. MAY, 8th.—“BOTANY,” by Mr. R.B.White.—In his opening remarks the lecturer emphasized the fact that although there is a universal love for flowers few know anything about them. This he attributed to the imaginary difficulty of learning the proper names; until the plant itself is known no attempt should be made to memorize names—when the plants are known the names will soon follow. The study of plants was valuable in that it cultivated observation and reflection, enabled us to better understand the world we live in and added greatly to the pleasure of life.

After briefly outlining the natural system of classification by means of which plants are divided into families, orders and genera the lecturer told how plants should be studied. He

recommended that some elementary book on Botany be carefully read and that the beginner, instead of labouriously attempting to analyse a plant and determine its name by means of a key, select first a number of species with which he is acquainted and then compare them with the descriptions in the book used looking up the meaning of every word not understood. By this means anyone would in a short time become familiar with all the descriptive botanical terms in common use. Representatives of some of the large orders were then analysed in the way suggested.

The importance of ample field notes was emphasised and the uses of note-books and analysis books explained. The preparation of specimens for the herbarium was also described. The lecturer explained that the methods suggested by him were not intended to take the place of more complete botanical studies when such were possible and recommended that the preliminary work should be followed by the study of physiology and morphology.

6. MAY, 15th.—“ZOOLOGY,” by Prof. John Macoun and Mr. W. S. Odell.—Prof. Macoun confined his remarks to a general outlining of the scope which zoological studies should cover pointing out that apart from Ornithology and Entomology comparatively little original work had been done by local students. He showed that the smaller mammals, fish and reptiles of the Ottawa region, as well as nearly all the lower forms of animal life, were yet to be worked up. Mr. Odell dealt principally with such small animals as could be well studied in a small aquarium illustrating his remarks with a very beautiful series of coloured drawings of the species described. A small aquarium for student's use could easily be made from the half-gallon or larger fruit jars in ordinary use. For use in larger aquaria he recommended the following plants: *Anacharis Canadensis*, *Ceratophyllum demersum*, *Myriophyllum*, *Proserpinaca*, *Ranunculus aquatilis*, *Callitriche*, *Chara*, *Nitella*, *Fontinalis* and *Lemna*. The manner in which many familiar forms of animals found in ponds and streams propagate was also described.

7. MAY, 22nd.—“PLANTING AND CARE OF FOREST TREES,” by Sir Henri Joli de Lotbinière.—The seventh and last lecture of the course was very appropriately of a somewhat more practical kind than those which preceded it. The lecturer showed that the wasteful destruction of Canadian forests was in very great measure due to the fact that the forests had from the earliest times been considered an enemy by the settler and that it was only in very recent years that the farmer had begun to learn that successful cultivation of the soil depended upon an abundance of trees in his neighbourhood. By means of a fine series of specimens and photographs he showed how rapidly some of our most valuable trees grow and how they should be pruned and cared for if the best results were to be obtained. The photographs showing the effects of good and bad pruning were exceptionally fine and illustrated the methods of tree culture and preservation followed on the lecturer's own estate.

SUB-EXCURSIONS.

Owing to the lateness of the season and the inclemency of the weather on two of the days upon which sub-excursions were to be held, they were this year not quite so satisfactory as usual, as regards results, though the attendance on all fine days was exceptionally large. The snow still lay deep in the woods at the time of the first excursion to Rockcliffe, April 15th, though the rocky ridge was bare. No plants were found in flower and no insects seen. A comparison of the results of the sub-excursion held one day later in 1898 will show how late the present spring was in opening. Large and interesting collections of fossils were made at this and other sub-excursions and a comparative list of these will appear in an early number of THE NATURALIST. Such bird notes as were worthy of record have been, or will be, printed in the monthly Ornithological Notes.

APRIL 22nd.—The sub-excursion to the Beaver Meadow west of Hull at this date was hardly more successful than that held a week previous though the day was fine and the attend-

ance large. No insects were collected and the only flowers seen were *Hepatica triloba* and *H. acutiloba*. The catkins of *Alnus incana* and *Salix discolor* were well developed. One specimen of *Peziza coccinea* was collected. Miss Halkett secured a fine specimen of the Red-bellied Snake (*Storeria occipitomaculata*).

APRIL 29th.—BEECHWOOD.—There was a large attendance at this sub-excursion, many of those present collecting at Beechwood their first spring flowers. Before returning to the city Prof. Macoun delivered an address on the plants found during the afternoon, drawing special attention to the catkin-bearing trees and shrubs. Both species of *Hepatica* were found, *Trilliums* white and red, the Wild Ginger, the large-flowered Bellwort, Blue Cohosh, *Claytonia Caroliniana*, *Dentaria laciniata*, *D. diphylla* and a few others. One of the striking objects collected was the beautiful Scarlet Cup (*Peziza coccinea*). Dr. Fletcher spoke of the few insects seen. These were very few, a single specimen of the Spring Azure (*Lycæna neglecta*) and one of the oil beetles (*Meloe niger*), which it was explained laid its eggs on flowers and the larvæ (called triungulins) on hatching remained there until the flowers were visited by a bee when they attached themselves to the latter and were carried by it to its nest where they lived as parasites. Specimens of the Tree Frog (*Hyla versicolor*) and Viscid Salamander (*Plethodon glutinosus*) were found by Mr. A. Halkett.

MAY 6th.—AYLMER.—Over 150 members of the club and their friends attended this excursion. Flowers of several kinds were abundant and the Trailing Arbutus was seen growing for the first time by many who before knew it only by name. The botanical leaders not reaching the place of rendezvous at the specified time Dr. Fletcher was requested to speak on the plants collected. Among the more interesting of those exhibited were *Sanguinaria Canadensis*, *Shepherdia Canadensis*, *Epigæa repens*, *Amelanchier Canadensis*, *Waldsteinia fragarioides*, *Vaccinium Pennsylvanicum*, *Corydalis aurea*, *Antennaria Canadensis* and *Viola Muhlenbergii*. Dr. Fletcher also spoke on insects. Few were collected, the season being still backward. A few species

had, however, rewarded the entomologists, *Thecla Nippon*, freshly emerged, was seen on a pine tree, *Pieris oleracea-hiernalis* and *Lycaena Lucia* were also exhibited. Mr. Halkett described the zoological specimens collected. Chief among these was a Salamander—the Red Triton (*Spelerpes ruber*) found by Mr. Halkett himself, a very fine Green Snake (*Cyclophis vernalis*) by someone unknown and a Garter Snake *Eutania sirtalis ordinata* by Mr. Oswald Ingall. The proposed excursions to Rockcliffe and the Beaver Meadows, May 13th and 20th, were not made, both days being wet. The first general excursion to Chelsea, May 27th, was postponed for the same reason.

ORIOLES FEEDING ON TENT CATERPILLARS.—On the 23rd. of May whilst enjoying a walk in the Mountain Park at Montreal my attention was arrested by a Baltimore Oriole not more than a dozen paces from me and I stood admiring the brilliant colouring of his plumage for a few moments. My interest in his movements became deeper, however, when I saw him station himself beside a bunch of tent caterpillars whose webs were to be seen on the bushes and small trees in all directions. The bird made a hasty meal off the caterpillars, eating one after another until his appetite was apparently quite satisfied. The caterpillars were large, about an inch in length and nearly a dozen were destroyed in this way to form our benefactor's mid-day meal.—LAWRENCE LAMB.

COPRINUS COMATUS.—The Shaggy Mushroom is seldom found in this vicinity in the spring, but owing to the heavy May rains it has appeared on the newly made ground on the west side of the canal, quite close to Sapper's Bridge. This is one of the best mushrooms, is easily digested and may be eaten in any quantity. J.M.

METEOROLOGICAL OBSERVATIONS FOR OTTAWA, 1898.

Contributed by Dr. R. F. Stupart, Director of the Meteorological Service, Toronto, Ont.

Frequency of the Different Winds from Observations at 8 a.m., 3 and 8 p.m., Daily, Ottawa, 1898.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm
January	9	11	9	14	5	6	13	26	0
February	10	3	7	21	6	8	9	20	0
March	4	4	7	25	7	11	11	22	2
April	17	15	7	15	5	6	11	13	1
May	12	10	5	20	10	13	8	13	2
June	6	7	12	8	5	11	17	15	9
July	19	3	8	12	6	14	20	10	1
August	21	8	8	12	5	12	7	20	0
September	13	5	6	7	6	11	24	18	0
October	11	12	7	28	5	11	9	10	0
November	4	11	9	8	18	7	15	17	1
December	11	13	10	2	14	20	9	10	4
Year	137	102	95	172	92	130	153	194	20

January 30—Coldest day of year, mean temperature—19°.9.

February 16—Stormiest day of year, mean velocity of wind 24.4 miles per hour.

" 20-22—Heaviest snow storm of year, depth of fall 24 inches.

April 4—Last measurable snow. Some flakes on 5-6.

May 6—Last frost of season.

" 12—First thunder of year.

July 20—Warmest day of year, mean temperature 79°.75.

Sept. 30—Last thunder of year.

October 9—First recorded frost of season.

" 22—Heaviest rain storm of year, depth 1.12 inches.

" 27—Earthquake shock at 1.03 a. m.

Nov. 10—First measurable snow, 4 in. fell, flakes on Oct. 27.

Dec. 12—First record below zero—7°.6.

Abstract of Meteorological Observations at Ottawa for the Year 1898.

	MONTH.												YEAR.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
Average height of barometer at 32° and reduced to sea level	30.020	30.060	30.149	29.981	29.914	29.932	29.995	29.927	29.989	30.079	30.049	29.961	30.008
Highest barometer	30.490	30.483	30.603	30.328	30.236	30.326	30.449	30.255	30.192	30.462	30.463	30.636	30.636
Lowest barometer	29.273	29.560	29.339	29.575	29.550	29.279	29.666	29.635	29.554	29.489	29.461	29.304	29.273
Monthly and annual ranges	1.217	0.914	1.204	0.753	0.686	1.047	0.783	0.620	1.338	0.973	1.002	1.352	1.363
Average temperature of air (Fah.)	10.63	18.97	33.65	43.36	57.32	66.21	69.72	67.50	61.02	46.62	32.69	17.81	43.79
Difference from average	+0.63	+6.97	+13.25	+3.26	+2.42	+1.11	+0.22	+2.60	+3.52	+2.62	+1.09	+0.81	+3.21
Highest temperature	39.0	43.0	57.0	71.0	82.8	86.9	95.0	85.0	90.0	77.0	60.0	40.7	95.0
Lowest temperature	-24.6	-20.5	-1.2	12.3	32.9	45.1	41.0	42.6	33.2	26.0	6.5	-23.3	-24.6
Monthly and annual ranges	63.6	63.5	58.2	58.7	49.9	41.8	54.0	42.4	56.8	51.0	53.5	64.0	119.6
Average maximum temperature	20.44	26.85	42.36	54.92	67.74	76.80	82.96	77.52	72.28	54.10	40.15	26.39	53.54
Average minimum temperature	0.83	11.10	24.95	31.81	46.91	55.62	58.22	57.49	49.77	39.15	25.23	9.23	34.19
Average daily range	19.61	15.75	17.41	23.11	20.83	21.18	24.74	20.03	22.51	14.95	14.92	17.16	19.35
Average pressure of vapour	0.071	0.099	0.168	0.189	0.339	0.482	0.525	0.509	0.428	0.270	0.165	0.100	0.279
Average humidity of the air	81	81	80	61	65	69	63	74	74	79	82	86	75
Average temperature of dew point	11.0	18.2	30.1	23.1	48.3	58.0	60.4	59.5	54.7	42.3	29.7	18.4	39.5
Amount of rain in inches	0.66	0.90	2.13	0.55	2.46	2.24	2.87	3.22	3.48	5.68	0.36	0.41	24.96
Difference from average	+0.16	+0.26	+1.33	-0.87	0.00	-0.72	-0.34	+0.07	+0.95	+3.21	-1.31	-0.34	+2.40
Number of days of rain	3	1	8	3	13	9	10	15	16	13	5	4	100
Amount of snow in inches	36.4	34.3	.....	2.0	.....	.....	.....	.....	.....	.....	.....	.....	110.6
Difference from average	+11.7	+12.7	-17.8	-2.2	.....	.....	.....	.....	.....	.....	.....	.....	.....
Number of days of snow	12	11	.....	1	.....	.....	.....	.....	.....	.....	+1.6	+5.3	+11.3
Percentage of sky clouded	61	71	46	44	66	63	50	62	57	64	67	77	39
Number of days completely clouded	10	13	5	1	1	1	1	1	3	10	9	16	61
Average velocity of wind (miles)	6.2	8.7	6.6	7.5	6.2	5.0	5.6	6.1	6.1	7.5	8.8	9.5	7.0
Number of auroras	0	0	0	0	0	1	1	0	2	0	0	0	4
Number of thunder storms	0	0	0	0	3	3	7	3	3	0	0	0	19
Number of fogs	1	1	2	0	0	0	0	0	1	0	5	0	10
Number of days without rain or snow	11	10	20	21	17	18	19	15	11	16	15	9	182

Days of rain or snow only reckoned when 0.01 inch or over fell.

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SOME RECENT ADDITIONS TO THE LABRADOR FLORA.

M. L. FERNALD AND J. D. SORNBORGER.

Two extensive collections, secured during the present decade from the Labrador coast and Hamilton Inlet, have added very materially to our knowledge of that still little explored region. The first of these collections, consisting of about three hundred numbers, was made by members of the Bowdoin College Expedition, which, in 1891, accomplished the difficult ascent of the Hamilton or Grand River and the re-discovery of the mysterious Grand Falls whose location and height were so long known only through vague reports.¹ Owing to the extreme hardships of the trip it was unfortunately impossible to preserve such plants as were collected in the upper valley of the river. A second division of the party, however, collected extensively about Lake Melville and up the coast as far as Hopdale. Many of these plants, sent for determination to the Gray Herbarium by Professor Leslie A. Lee who was in charge of the expedition, are of great geographic interest.

Another collection containing rather more species has been secured by Mr. J. D. Sornborger from various stations on the Labrador coast as far north as Cape Chudleigh. These plants, mostly secured in quantity, were collected largely by Mr Sornborger during the summers of 1892 and 1897, though many valuable specimens have been sent him by the Rev. Adolf Stecker of the Unitas Fratrum, who has collected plants at a season when Labrador is inaccessible, and

¹ For the narrative of this expedition see Packard, *The Labrador Coast*, N. Y., 1891, pp. 507-513.

to whom special acknowledgement is made for these and many other important services. A few specimens from Hebron have been sent by Mrs. Hlawatscheck. These large collections contain nearly three score of species not included in former lists of Labrador plants; and, with the collections of the Bowdoin College Expedition, they furnish so remarkable an addition to our knowledge of that flora as to make desirable the preparation of the following notes.

In the list which follows, no attempt is made to enumerate all the plants of either collection: the larger portion of them, naturally, are well known northern species which have been collected many times in Labrador. The species enumerated are for the most part such as are not credited to Labrador by Mr. James M. Macoun in his "List of plants known to occur on the coast and in the interior of the Labrador Peninsula,"² and such plants are indicated by the asterisk (*) before the name of the species. A few of these species are included in Mr. Macoun's list from the valleys of the Rupert and East Main Rivers and from James Bay, but not from Labrador proper as defined in the eighth report of the Canadian Survey (1895) and its accompanying maps.³ Some of the species, not enumerated in Mr. Macoun's list but here included, have been already noted from Labrador in the contributions from the Herbarium of the Geological Survey of Canada, in the Rev. Arthur C. Waghorne's "Flora of Newfoundland, Labrador, and St. Pierre et Miquelon" or elsewhere. In these cases, however, the former record of the plant is noted. While studying the two collections which are the principal source of these notes occasional Labrador specimens of some of the noteworthy species there represented have been found in the Gray Herbarium, and for the sake of completeness records of these are here included.

² Ann. Rep. Geol. Survey Can., N. S. viii (1895), Part L, App. vi.

³ Thus Labrador, as here understood, is that portion of the Labrador Peninsula lying east of a line drawn directly north from Blanc Sablon to 52° N. lat., thence following the height of land to a point on the mainland-shore nearly south of Port Burwell, Cape Chudleigh.

The list of plants enumerated by Mr. J. M. Macoun from the coast of Labrador was based, according to his introductory note, primarily upon the former list prepared by Professor John Macoun for Packard's Labrador coast. At the time of the preparation of that list, however, much was considered as Labrador which the recent survey includes in Quebec; and many reports, in Packard's work, of plants from "Labrador," were apparently based upon specimens from Caribou Island and other points now included in Quebec. Other reports of species have been based upon Mr. John A. Allen's and some smaller collections from Bonne Espérance, Eskimo Island and other stations west of the present Labrador line. Scattered reports, based upon the collections of Lieut. L. M. Turner on Ungava Bay, have been made of plants as Labrador species, but these, of course, cannot be accepted for Labrador proper. A few species, on the other hand, included in Packard, appear to be reported only indefinitely from Labrador, *i.e.* without definite statement of localities. All such plants as are contained in the Bowdoin and the Sornborger collections and have been recorded only in a general way from Labrador, or collected at stations beyond the recently defined limits of that dependency are here indicated by the † before the name.

The plants enumerated below are of interest not merely as additions to the Labrador flora or as species little known from that peninsula; but many of them are of much broader geographic interest. Ten of them—*Phegopteris polypodioides*, *Iris versicolor*, *Sagina procumbens*, *Nasturtium terrestre*, *Ribes lacustre*, *Pyrus arbutifolia*, var. *melanocarpa*, *Viola Selkirkii*, *Galium tinctorium*, var. *labradoricum*, *Aster longifolius*, var. *villicaulis*, and *Aster puniceus*, var. ———— are here recorded from stations considerably north of their former known limits on our eastern coast.

Some of them, however, *Phegopteris polypodioides*, *Sagina procumbens*, *Nasturtium terrestre*, and *Viola Selkirkii*, for example, are well known even from Arctic sections of Europe, Asia or Western America. On the other hand, six species are

now brought decidedly south of their supposed ranges on the eastern coast. The ranges of *Lychnis affinis*, *Sagina nivalis* and *Braya purpurescens* are extended south from Hudson Straits, of *Crepis nana* from Melville Peninsula, and of *Draba hirta*, var. *arctica* and *Lesquerella arctica* south from Grinnell Land.

Several plants formerly known only from regions much further to the west are now found on the Atlantic coast. *Lathyrus maritimus*, var. *aleuticus*, a form apparently common on the Labrador coast, was recently described from the north Pacific coast of America, and *Arnica alpina*, var. *Lessingii*, found by Mr. Sornborger on the mountains at Rama, has been known only from extreme northwestern America and adjacent Asia. *Luzula parviflora*, var. *fastigiata* and *Draba stenoloba* have been unknown east of the Rocky Mountains. *Petasites sagittata* and *Senecio palustris* are apparently unrecorded east of Hudson Bay. *Poa glumaris*, a common grass of the Alaskan shores, has been well known from the mouth of the St Lawrence, and is now found at Nain, well up the Labrador coast. *Vaccinium ovalifolium*, common in northwestern America, has been known only from Lake Superior and Gaspé Peninsula in the east. The range of *Viola canina*, var. *adunca* is now extended from its almost extra-limital station on the Ottawa to the north coast of Labrador.

Three Greenland species, not generally supposed to occur on the American continent, are represented in these collections—*Polygonum islandicum*, already reported from Rupert river and James Bay, is probably common on the Labrador coast; while *Arenaria uliginosa* and *Potentilla Ranunculus* were found at only one station each.

Some plants, new to Labrador or little known from that region, are of interest as highly local species. *Phleum alpinum*, *Juncus trifidus*, *Cardamine bellidifolia* and *Arenaria ciliata*, var. *humifusa* occur on the higher mountains of New England or adjacent Canada and in Greenland, and by analogy should be expected abundantly in Labrador, where they are apparently of

rare occurrence. In fact, *Cardamine bellidifolia*, found during the past three-fourths of a century at only four stations in British America, may be considered a very rare plant. Another species, *Pleurogyne carinthiaca*, var. *pusilla*, growing in Greenland and at various stations about the mouth of the St. Lawrence, and reported by Pursh from the White Mountains of New Hampshire, is apparently a very rare plant in Labrador, collected by the Bowdoin College party for the first time since Hooker's report of its occurrence there.

Five species not before known from the Labrador coast have been without doubt recently introduced from Europe or the more settled portions of America. These are *Stellaria media*, *Thlaspi arvense*, *Erodium cicutarium*, *Senecio vulgaris*, and *Taraxacum officinale*. *Rumex acetosella* and *Ranunculus repens* should probably also be included in this list. In Packard's "Labrador coast" (449), he quotes from Koch "The northernmost valleys in which firs grow open into Napartok Bay. North of Napartok Bay (Napartok means fir) [more properly spruce] are found only dwarf willows and birches; mosses and lichens form the principal covering of the ground. . . . " These valleys, opening from the mainland are somewhat sheltered, and it is here that the Eskimo of Hebron secure their fuel and building material. On the more exposed Takatak Island at the mouth of the bay, however, spruce trees attain considerable size. This station, some fifteen miles nearer the open sea than the mainland valleys, is probably the northern limit of trees on the exposed coast of Labrador. North of Napartok Bay, within ten miles of the mouth of Kangerdluksoak Bay, willows grow to a height of at least eight feet.

In the following list the species already discussed and many others of note are enumerated in the order of Engler and Prantl, and their Labrador stations so far as known are recorded.

*WOODSIA ILVENSIS, R. Br.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (Sornborger, No. 2).

**ASPLENIUM FILIX-FOEMINA*, Bernh.

Webeck Harbor, Aug, 4, 1891 (*Bowdoin College Exped.* No. 215).

**ASPIDIUM SPINULOSUM*, Swartz, var. *DILATATUM*, Hook.

Hopedale, Aug. 6, 1897 (*Sornborger*, No. 140); Red Bay, Chateau Bay, North West River, Webeck, Hopedale, Turner's Bay, July, Aug, 1891 (*Bowdoin College Exped.* Nos 48, 86, 160, 217, 251, 268). Probably this is the commonest form of the species in Labrador.

**PHEGopteris POLYPODIOIDES*, Fée,

Battle Harbor, July 18, 1891 (*Bowdoin College Exped.* No. 109 ;) Webeck Harbor, July 22-24, 1892 (*Sornborger*, No. 136).

†*PHEGopteris DRYopteris*, Fée.

Webeck Harbor, Aug. 4, 1891 (*Bowdoin College Exped.* No. 216); July 22-24, 1892 (*Sornborger*, No. 135); Tub Harbor, July, 11, 1892 (*Sornborger*, No. 137 x); Makkovik, Aug. 1896, coll. *Adolf Stecker* (*Sornborger*, No. 138). Reported in Packard's list from Caribou Island, Quebec. (S. R. Butler), Formerly collected at Okak by *Knaus*.

**EQUISETUM VARIEGATUM*, Schleich.

Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 147 y).

**LYCOPodium ANNOTINUM*, L., var. *PUNGENS*, Spring.

Common among dwarf spruces in sandy low ground, Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 54); Chateau Bay, July, 14, 1891, Red Bay, July, 2, 1891 (*Bowdoin College Exped.* Nos. 85, 50).

**LYCOPodium ALPINUM*, L.

Among spruces, Davis Inlet, Aug, 1, 1892 (*Sornborger*, No. 56.)

**LYCOPodium COMPLANATUM*, L.

Among spruces, Davis Inlet, Aug. 1, 1892 (*Sornborger*, No. 56 x).

†*LARIX AMERICANA*, Michx.

Red Bay, July 4, 1892, (*Sornborger*, No. 183) An abundant tree, growing considerably north of Nain. Included with

the two following species in Packard's list only on the authority of Hooker.

**PICEA ALBA*, Link.

Tub Harbor, July 11, 1892 (*Sornborger*, No. 182) See note under *Larix*.

**PICEA NIGRA*, Link.

Chateau Bay, July 14, 1891 (*Bowdoin College Exped.* No. 84). See note under *Larix*.

†*TRIGLOCHIN MARITIMUM*, L.

Mallijak, July 18, 1892 (*Sornborger*, No. 107). Reported by Packard from "coast of Labrador (Dr. Morison)." Formerly collected at Nain by *Lundberg*.

**HIEROCHLOE BOREALIS*, R.S.

Mallijak, Hamilton Inlet, July 18, 1892 (*Sornborger*, No. 250). Formerly reported by Macoun (Cat. Can. Pl. pt. iv. 187) from "Coast of Labrador (*McGill Coll. Herb*)," but not included in his subsequent list (1895) nor in Packard's "Labrador Coast" (1891).

**PHLEUM ALPINUM*, L.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 283).

CALAMAGROSTIS LANGSDORFFII, Trin.

Hopedale, Aug. 4-6, 1897, Aillik, July 27, 1892 (*Sornborger* Nos. 242, 261). Abundant at Rama before the Eskimo house just above the beach.

**AGROSTIS RUBRA*, L.

Hopedale, Aug. 4-6, 1897, Hebron, July, 1896—coll. *Mrs. Hlawatscheck* (*Sornborger*, Nos. 244, 252).

**POA LAXA*, Hænke.

Rama, Aug. 15, 1892 (*Sornborger*, No. 257).

**POA GLUMARIS*, Trin.

Nain, Aug. 11, 1897 (*Sornborger* No. 239). Collected in 1849 on the southern coast of Labrador by Dr. Storer, and in 1860 by Martin and Bryant; also found on the sea-shore at

Bonne Espérance, Quebec (near the Labrador border), July 26, 1882 (J. A. Allen, No. 24).

*PUCCINELLIA ANGUSTATA, Nash (*P. maritima* var. *minor*, Watson).

Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* No. 249), abundant on the beach below high water, Aug. 4-6, 1897 (*Sornborger*, No. 237); Nain, Aug. 11, 1897 (*Sornborger*, No. 238). Also collected at Salmon Bay, Quebec (near the Labrador line), July 28, 1882 (J. A. Allen, No. 27).

AGROPYRON VIOLACEUM, Vasey.

Rama, Aug. 20-24, 1897 (*Sornborger* No. 263).

†CAREX SALINA, Wahl.

Rama, July 15—Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 271). Formerly collected by *J. A. Allen* at Fox Harbor (Labrador?), and reported by Packard without definite locality.

*CAREX MARITIMA, Mull.

Mulligan Point, Lake Melville, July 25, 1891 (*Bowdoin College Exped.* No. 132); near Eskimo Island, Hamilton Inlet, July 14, 1892 (*Sornborger*, No. 260).

†CAREX RARIFLORA, Smith.

Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 258); Webeck Harbor, July 22-24, 1892 (*Sornborger*, No. 45). Allen's plant included in Packard's list is from Bonne Espérance, Quebec.

*CAREX GLAREOSA, Wahl.

Rama, Aug. 20-24, 1897 (*Sornborger*, No. 256). Collected at Watsheeshoo, Quebec, July 2, 1882 (*St. Cyr*), and at Cape Chudleigh (*R. Bell*).

*CAREX NARDINA, Fries.

Rama, Aug. 15, 1892 (*Sornborger*, No. 246.)

CAREX CANESCENS, L., var. *ALPICOLA*, Wahl.

Hopedale, Aug. 4-6, 1897, Nain, Aug. 4, 1892 (*Sornborger*, Nos. 259, 269).

*LUZULA PARVIFLORA, Desv., var. *FASTIGIATA*, Buchenau.

Tub Harbor, July 11, 1892 (*Sornborger*, No. 272). In America not formerly known east of the Rocky Mts.

**JUNCUS BALTICUS*, Willd., var. *LITTORALIS*, Engelm.

Mulligan's Point, Hamilton Inlet, July 25, 1891 (*Bowdoin College Exped.* Nos. 130, 131).

**JUNCUS TRIFIDUS*, L.

On the rocky slope of a mountain, not above 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 284). Collected by *John A. Allen* at Carroll Cove, lat. 51° 40', Aug. 6, 1882 (No. 75).

†*SMILACINA TRIFOLIA*, Desf.

Battle Harbor, July 18, 1891 (*Bowdoin College Exped.* No. 107); Tub Harbor, July 11, 1892 (*Sornborger*, No. 222). Reported by Packard from Caribou Island, Quebec (*S. R. Butler*).

†*MAIANTHEMUM CANADENSE*, Desf.

Makkovik, Aug. 1896, coll. *Adolf Stecker* (*Sornborger*, No. 219); North West River, July 27, 1891 (*Bowdoin College Exped.* No. 159). Reported by Packard from Caribou Island, Quebec (*S. R. Butler*).

†*STREPTOPUS AMPLEXIFOLIUS*, DC.

Red Bay, July 12, Indian Harbor, Aug. 2, Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* Nos. 46, 199, 247); Mallijak, July 18, 1892 (*Sornborger* No. 223). Reported by Packard from Caribou Island, Quebec (*S. R. Butler*).

†*CLINTONIA BOREALIS*, Raf.

Chateau Bay, July 14, Battle Harbor, July 18, Northwest River, July 27, Red Bay, Sept. 6, 7, 1891 (*Bowdoin College Exped.* Nos. 80, 108, 158, 293); Pitts Arm, Henley Harbor, Sept. 24, 1892 (*Sornborger*). Reported by Packard from Caribou Island, Quebec (*S. R. Butler*).

**IRIS VERSICOLOR*, L.

Battle Harbor, July 18, 1891 (*Bowdoin College Exped.* No. 106).

†*HABENARIA OBTUSATA*, Rich.

Indian Harbor, Hamilton Inlet, Aug. 2, 1891 (*Bowdoin College Exped.* No. 198). Reported by Packard from Caribou Island, Quebec (*S. R. Butler*).

MYRICA GALE, L.

Tub Harbor, July 11, 1892, Makkovik, Aug., 1896—coll. *Adolf Stecker* (Sornborger, Nos. 69, 68); Mulligan Point, Lake Melville, July 25, 1891 (*Bowdoin College Exped.* No. 128).

*SALIX BROWNII, Bebb.

Low ground, by a brook, Hopedale, Aug. 4-6, 1897, Red Bay, July 4, 1892 (*Sornborger*, Nos. 13, 24); Chateau Bay, July 14, 1891, Indian Harbor, Hamilton Inlet, Aug. 2, 1891, Red Bay, Sept. 7, 1891 (*Bowdoin College Exped.* Nos. 77, 197, 291), Reported by Macoun from "Labrador (*Morrison*)" and "Nachvak and Ford's Harbor, Labrador (*R. Bell*)" (Cat. Can. Pl. pt iii. 444, 445, and pt. v. 356), but included in subsequent lists as *S. arctica*.

†BETULA GLANDULOSA, Michx.

Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 80). Formerly collected at Square Island, Aug. 15, 1882 (*J. A. Allen*, No. 71) Reported by Packard on the authority of Hooker from the Labrador coast, and from Caribou Island, Quebec (*S. R. Butler*).

*BETULA NANA, L., var. FLABELLIFOLIA, Hook.

Chateau Bay, July 14, 1891, Battle Harbor, July 18, 1891 (*Bowdoin College Exped.* Nos. 76, 105).

*RUMEX ACETOSELLA, L.

North West river, July 27, 1891 (*Bowdoin College Exped.* No. 156).

*RUMEX SALICIFOLIUS, Weinm.

North West river, July 27, 1891 (*Bowdoin College Exped.* No. 155).

*POLYGONUM ISLANDICUM, Meisner (*P. aviculare*, L., var. *boreale*, Lange).

Abundant about the houses and on refuse heaps in the Eskimo village, Nain, Aug. 4, 1892 (*Sornborger*, No. 81) appearing introduced; Mulligan Point, Lake Melville, July 25, 1891 (*Bowdoin College Exped.* No. 127). Formerly listed by Macoun from Rupert river and the shores of James Bay, but not credited to America by Small in his monograph of the genus.

*LYCHNIS AFFINIS, Wahl.

Rocky banks of a brook, Rama, Aug. 20-24, 1897 (*Sornborger*, No. 36). Not otherwise positively known from Labrador, though formerly reported without locality.

*CERASTIUM TRIGYNUM, Vill.

Rama, Aug. 20-24, 1897 (*Sornborger*, No. 201). Formerly collected near Hopedale (*Kunth*) and at Cape Chudleigh, Aug. 7, 1884 (*R. Bell*).

*CERASTIUM ARVENSE, L.

Rocky banks of a ravine at an elevation of about 300 m., Rama, Aug. 4-6, 1897, and in coarse slaty detritus a little above high-water mark, beside the pool below a water fall, Rama, Aug. 20-24, 1897 (*Sornborger*, Nos. 204, 203). Formerly collected at Hopedale (*Kruth*) and at Ungava Bay, 1884 (*L. M. Turner*, No. 4,840); and reported by Waghorne from stations in southern Labrador.

*STELLARIA MEDIA, Cyrill.

Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* No. 219).

*STELLARIA LONGIPES, Goldie, var. LAETA, Watson.

Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* No. 221). Also reported from L'anse au Loup and Pack's Harbor by the Rev. A. C. Waghorne.

*ARENARIA CILIATA, L., var. HUMIFUSA, Hornem.

Individuals isolated, growing on a slope of moist slaty detritus immediately below a field of snow, at an elevation of about 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 126). Not formerly known in eastern America nearer than Lake Mistassini and the Gaspé mountains.

*ARENARIA VERNA, L.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 209).

*ARENARIA VERNA, L., var. HIRTA, Watson.

Rama, July 15 Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 208); Aug. 20-24, 1897 (*Sornborger*, No. 286).

*ARENARIA ULIGINOSA, Schleich.

On slaty detritus, Rama, alt. 300 m., Aug. 20-24, 1897 (*Sornborger*, No. 150). Its first collection on the American continent. For further discussion and figure see B. L. Robinson, Bot. Gaz. xxv. 167, t. 13, f. 6.

*SAGINA PROCUMBENS, L.

Near sea-level, in moist detritus partially denuded by a mountain stream, Hebron, Sept. 12, 1897 (*Sornborger*, No. 207). Not definitely known before north of Newfoundland.

*SAGINA NIVALIS, Fries,

With the latter (*S. procumbens*), Hebron, Sept. 12, 1897 (*Sornborger*, No. 207 x). Collected by A. P. Low along the Ungava River in 1896. Otherwise known in America only from Alaska and the higher Rocky Mountains.

*THALICTRUM ALPINUM, L.

Ekortiarasuk, Cape Chudleigh, Aug. 20-30, 1896 (*Rev. C. Schmitt*). Formerly collected at Cape Chudleigh by R. Bell.

*RANUNCULUS REPENS, L.

Square Island Harbor, Sept. 3, 1891 (*Bowdoin College Exped.* Nos. 277, 278).

*DRABA STENOLOBA, Ledeb.

On a slope of moist slaty detritus immediately below a field of snow, at an elevation of about 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, Nos. 61, 175). Not previously recorded east of the Rocky Mountains of British America.

*DRABA HIRTA, L., var. ARCTICA, Watson.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, No. 212). In America formerly known only from Grinnell Land where it was collected by *Lieut. A. W. Greeley*.

*DRABA ALPINA, L.

Ekortiarasuk, Cape Chudleigh, Aug. 20-30, 1896 (*C. Schmitt*). Formerly collected at Cape Chudleigh by R. Bell, Aug. 6, 1884.

*DRABA NIVALIS, Lilj.

Ekortiarasuk, Cape Chudleigh, Aug. 20-30, 1896 (*C. Schmitt*). Formerly collected at Okak by members of the Unitas Fratrum.

*LESQUERELLA ARCTICA, Watson.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (Sornborger, No. 59). Not formerly reported nearer than Greely's station in Grinnell Land.

*THLASPI ARVENSE, L.

Chateau Bay, July 14, 1891 (*Bowdoin College Exped.* No. 52). Reported by Waghorne from about houses, Capstan Island and Pixware River.

*BRAYA PURPURASCENS, Bunge.

Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker* (Sornborger No. 60). Formerly collected on Hudson Straits by *R. Bell*.

COCHLEARIA ANGLICA, L.

Shores of a small island, Seal Islands, Sandwich Bay, July 6, 1892 (*Sornborger*, No. 169). Collected by *Martin* on Caribou Island, Quebec, in 1860, and by *Allen*, in the crevices of rocks, Bonne Espérance and Peroquet Island, Quebec (near the Labrador boundary), July, 1882 (Nos. 58, 57). Also reported by Waghorne from "Partly Modiste and L'anse au Clair."

*NASTURTIUM TERRESTRE, R. Br.

North West River, July 27, 1891 (*Bowdoin College Exped.* No. 133).

*CARDAMINE BELLIDIFOLIA, L.

Individuals isolated, on a slope of moist slaty detritus immediately below a field of snow, at an elevation of about 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 174); Ekortiar-suk, Cape Chudleigh, Aug. 20-30, 1896 (*Rev. C. Schmitt*). Formerly collected by members of the *Unitas Fratrum* at Okak, but previously recorded in British America only from the early collections of Richardson and Drummond, and from two very limited stations in the Selkirk and Rocky Mountains.

DROSERA INTERMEDIA, Hayne, var. AMERICANA, DC.

Square Island Harbor, Sept. 3, 1891 (*Bowdoin College Exped.* No. 279).

**SAXIFRAGA STELLARIS*, L., var. *COMOSA*, Poir.

Webeck Harbor, July 22-24, 1893 (*Sornborger*, No. 188). Formerly collected at Okak by members of the *Unitas Fratrum*, and on moist cliffs, Whale Island, Chateau, Aug. 11, 1882 (*J. A. Allen*, No. 46).

**RIBES LACUSTRE*, Poir.

Red Bay, July 12, 1891 (*Bowdoin College Exped.* No. 30). Reported by Waghorne from L'anse au Clair and L'anse au Mort.

RUBUS STRIGOSUS, Michx.

Mallijak, Hamilton Inlet, July 18, 1892 (*Sornborger*, No. 223). Collected in southern Labrador in 1849 by Dr. Storer. Reported by Macoun (*Cat. Can. Pl. pt. i.* 130) from "Coast of Labrador (*McGill Coll. Herb.*)," but not included in his subsequent list.

DRYAS OCTOPETALA, L., var. *INTEGRIFOLIA*, C. & S.

Rocky ridge at about 100 m. alt., Rama, Aug. 20-24, 1897 (*Sornborger* No. 48). This is apparently the plant of the Labrador coast and Anticosti, reported at various times as *D. octopetala*. Pursh collected it on Anticosti as he did also *D. Drummondii* (see specimens in Gray Herb.), but there is little to show that true *D. octopetala* grows on this coast.

**POTENTILLA NANA*, Willd.

Ekortiansuk, Cape Chudleigh, Aug. 20-30, 1896 (*Rev. C. Schmitt*). Reported by Rydberg from Labrador (coll. *Kohlmeister*).

**POTENTILLA RANUNCULUS*, Lange.

Rocky banks of a mountain brook, alt. 300 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 24 x). Its first collection on the American continent.

**PYRUS ARBUTIFOLIA*, L. f., var. *MELANOCARPA*, Hooker.

Webeck Harbor, July 22-24, 1892 (*Sornborger*).

**PYRUS SAMBUCIFOLIA*, C. & S.

Aillik, July 27, 1892 (*Sornborger*, No. 123).

**LATHYRUS MARITIMUS*, Bigelow, var. *ALEUTICUS*, Greene, in White, Bull. Torr. Cl. xxi. 450.

Growing in the sandy delta of a small river, with *Oxytropis campestris*, DC., var. *caerulea*, Koch and *Astragalus alpinus*, L., at a distance of 150 m., from high water and some 6 m., above it, Nain, Aug. 11, 1897 (*Sornborger*, No. 220). *L. maritimus*, Bigelow, was not found on this delta, but undoubtedly occurs on the beaches near Nain. Chateau Bay, July 14, 1891, Battle Harbor, July 18, 1891, Hopedale, Aug. 11, 1891 (*Bowdoin College Exped.* Nos. 58, 92, 223). Formerly collected at Dumplin Harbor, July, 1864 (*B. Pickman Mann*). Probably a common plant.

**ERODIUM CICUTARIUM*, L' Her.

Beside paths in sandy soil near gardens, Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 148). Apparently introduced.

**VIOLA SELKIRKII*, Pursh.

Beside a mountain brook at slight elevation, Rama, July 15-Aug. 20, 1894, coll. *Adolf Stecker*, (*Sornborger* No. 101.) Reported by the Rev. A. C. Waghorne from Battle Harbor.

VIOLA PALUSTRIS, L.

Webeck Harbor, July 20-22, 1892 (*Sornborger*, No. 102). Reported by Waghorne from Battle Harbor and formerly collected, with no definite record of locality, by *Dr. Bryant*.

**VIOLA CANINA*, L., var. *ADUNCA*, Gray.

By a brook, Rama, Aug. 15, 1892 (*Sornborger*, No. 104x). Not formerly known east of the Ottawa River.

**EPILOBIUM HORNEMANNI*, Reichenb.

Mallijak, Hamilton Inlet, July 18, 1892 (*Sornborger*, Nos. 91, 95); Makkovik, Aug. 1896, coll. *Adolf Stecker*, Rama, July, 15-Aug. 20, 1894, coll. *Adolf Stecker* (*Sornborger*, Nos. 92, 90). Formerly collected by members of the *Unitas Fratrum* at Okak and reported by Waghorne from a number of points on the southern coast.

EPILOBIUM ANAGALLIDIFOLIUM, Lam.

Growing in compact bunches, on a slope of moist slaty detritus immediately below a field of snow, at an elevation of about 500 m., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 46).

EPILOBIUM LINEARE, Muhl., var. OLIGANTHUM, Trelease.

Indian Harbor, Hamilton Inlet, Aug. 2, 1891 (*Bowdoin College Exped.* No. 182); Hebron, Sept. 12, 1897, in moist ground with *Sphagnum*, Makkvik, Aug., 1896, coll. *Adolf Stecker* (Sornborger Nos. 47, 93).

*VACCINIUM OVALIFOLIUM, Smith.

Red Bay, July 12, 1891 (*Bowdoin College Exped.* No. 294); Pitts Arm, Henley Harbor, Sept. 24, 1892 (*Sornborger*). Collected by *J. A. Allen* at Chateau, Aug. 8, 1882, also on Mt. Albert, Gaspé. Recently found by *Rev. A. C. Waghorne* in Newfoundland, White Bay, Sept. 1891.

CHIOGENES SERPYLLIFOLIA, Salisb.

Chateau, July 14, 1891 (*Bowdoin College Exped.* No. 67). Reported by Packard, on the authority of Hooker, from the Labrador coast.

†PRIMULA EGALIKSENSIS, Hornem.

Battle Harbor, July 18, 1891 (*Bowdoin College Exped.* No. 103). Formerly reported from northern Labrador, but Lieut. Turner's specimens, upon which this report was based, are from Ungava Bay.

PLEUROGYNE CARINTHIACA, Griseb., var. PUSILLA, Gray.

Eskimo Island, Hamilton Inlet, Aug. 26, 1891, Square Island Harbor, Sept. 3, 1891 (*Bowdoin College Exped.* Nos. 276, 283). A rare plant, previously known in Labrador only from Hooker's report, though well-known from Anticosti, Rivière-du-Loup, and other points near the mouth of the St. Lawrence.

*HALENIA BRENTONIANA, Griseb.

Red Bay, Sept. 6 and 7, 1891 (*Bowdoin College Exped.* No. 290).

EUPHRASIA LATIFOLIA, Pursh.

Makkvik, Aug., 1896, coll. *Adolf Stecker* (Sornborger, No. 28); Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 82).

*GALIUM TINCTORIUM, L., var. LABRADORICUM, Wiegand.

In *Sphagnum* near a brook, Hebron, Sept. 12, 1897 (*Sornborger*, No. 180). Based in part upon a Labrador specimen collected by Dr. Storer.

VIBURNUM PAUCIFLORUM, Pylaie.

Red Bay, July 12, Webeck, Aug. 4, 1891 (*Bowdoin College Exped.* Nos. 34, 204). Red Bay, July 4, 1892, Makkovik, Aug., 1896 (*Sornborger*, Nos. 41, 40). Formerly collected at Okak (*Herb. J. Gay*). Reported by Packard from Caribou Island, Quebec, (*S. R. Butler*).

*ASTER LONGIFOLIUS Lam., var. VILLICAULIS, Gray.

Makkovik, Aug., 1896, coll. *Adolf Stecker* (Sornborger No. 163). Not formerly known north of the St. John and Restigouche Valleys in New Brunswick.

*ASTER PUNICEUS, L., var. OLIGOCEPHALUS, Fernald, n. var.

A form of *Aster puniceus*, which it has been impossible to place with satisfaction, is the plant familiar to botanists who have collected in Tuckerman's Ravine and Oakes Gulf in the White Mountains of New Hampshire. This White Mountain form has long been known only from that region, but the Bowdoin College party brought back fine specimens from Labrador, though somewhat taller than those from the better-known alpine stations. Plants apparently referable to the same form have more recently been collected on the north shore of Lake Superior by G. S. Miller, Jr., and last September on hills at Bay of Islands, Newfoundland, by the Rev. A. C. Wagborne. The plant may be expected, then, to have a much broader range than we yet know. In the outer foliaceous bracts of the involucre this northern and alpine plant differs from other forms of *A. puniceus*, but this character is inconstant; and many heads have the involucre seemingly identical with that of true *A. puniceus*, showing the plant to be an extreme form of that species rather than a distinct specific type. The plant may be characterized as follows:

Stems from 2.5 to 7 dm. high (reduced in alpine specimens), more or less pubescent above, glabrate below: leaves from lanceolate to oblong-lanceolate, with conspicuously clasping bases, entire or sparingly appressed-serrate, glabrous or somewhat scabrous above, glabrous beneath or sparingly pubescent on the broad midrib: branches of the inflorescence shorter than

the leaves, bearing few or single large heads (in some alpine specimens the solitary terminal heads sessile): heads often subtended by leafy bracts, and with the outer involucre bracts generally broad and foliaceous.—LABRADOR, Red Bay, Sept. 7, 1891 (*Bowdoin College Exped.* No. 288): NEWFOUNDLAND, hills, Coal river, Bay of Islands, Sept. 14, 1898 (*A. C. Waghorne*): ONTARIO, Peninsula Harbor, Sept. 16, 1896 (*G. S. Miller, jr.*): NEW HAMPSHIRE, in the White Mountains near Crystal cascade, entrance to Glen road, July 18, 1891 (*G. G. Kennedy*); near the Half-way-House, Mt. Washington, Aug. 3, 1898 (*Mrs. E. H. Terry*); Tuckerman's Ravine, Aug. 20, 1898 (*W. W. Eggleston*); Oakes Gulf (*Edwin Faxon, E. F. Williams, et al.*).

**ANTENNARIA HYPERBOREA*, Don.

Rama, July 15. Aug. 20. 1894, coll. *Adolf Stecker* (Sornborger, No. 155). Formerly collected in Labrador by *Kohlmeister*, and at Okak by members of the *Unitas Fratrum*.

**ARTEMISIA BOREALIS*, Pall., var. *WORMSKIOLDII*, Besser.

Rocky ledges at about 200 m. alt., Rama, Aug. 20-24, 1897 (*Sornborger*, No. 62).

**PETASITES SAGITTATA*, Gray.

Maktovik, Aug., 1896, coll. *Adolf Stecker* (Sornborger, No. 85).

**ARNICA ALPINA*, Olin, var. *LESSINGII*, Torr. & Gray.

Banks of a mountain brook, about 100 m. above high water, Rama, Aug. 20-24, 1897 (*Sornborger*, No. 157). Previously recorded only from the northwest coast of America and adjacent Asia.

**SENECIO VULGARIS*, L.

Beside paths, in moist ground, Hopedale, Aug. 4-6, 1897 (*Sornborger*, No. 162).

**SENECIO PALUSTRIS*, Hook.

Battle Harbor, July 18, 1891, Indian Harbor, Hamilton Inlet, Aug. 2, 1891, Houlton Harbor, Aug. 19, 1891 (*Bowdoin College Exped.* Nos. 295, 188, 261):

HIERACIUM VULGATUM, Fries.

Rama, 1898, coll. *Adolf Stecker*.

*CREPIS NANA, Richardson.

Found only in a small outcrop of slate having a vertical cleavage, at about 200 m. above sea-level, covering an area of only 3 square metres, on the side of a mountain, Rama, Aug. 20-24, 1897 (*Sornborger*, No. 86). In British America previously known only from the early collections of Richardson, Parry, and Drummond "on the Copper-mine River" (Richardson in Franklin, 1st. Journ. ed. 2, 1823, App. vii. 757); "Repulse Bay, Five Hawser Bay and Lyon Inlet" (Parry, 2nd. Voyage, 1825, App. 397); "on the slaty debris of the Rocky Mountains (*Drummond*)" (Macoun, Cat. Can. Pl. pt. ii. 274).

*TARAXACUM OFFICINALE, Weber.

On the beach just above high water, at a fall where water casks are frequently filled by the fishermen, Rama, Aug. 20-24, 1897 (*Sornborger*, No. 64). Possibly introduced. Reported from Battle Harbor by Waghorne.

NOTES ON FRESH-WATER POLYZOA.

By WALTER S. ODELL.

The term Polyzoa or Bryozoa embraces a very large number of microscopic animals mostly marine, but to a smaller extent found in fresh water. It is only with the fresh-water species we have to deal in this paper. The question will be asked what are Polyzoa? They are a class of molluscoidea including minute animals, which by budding form compound colonies." Bryozoa is the name applied to the same class by many zoologists.

Polyzoa are so called from the fact that the animals which constitute them live together in colonies in large numbers. They are not all microscopic. Most of them are readily distinguished with the naked eye, but require a pocket lens or a microscope to reveal further details. They vary much

n size, from that of a pea, to several feet in diameter [a specimen measuring one foot in diameter was found in Patterson's Creek just above Elgin St. bridge.] Each individual of a colony is called a Polypide. It is a very beautiful object under the microscope, most delicate in structure and transparent. Whenever disturbed the polypide retracts quickly into its case or cœnœcrum. Altogether it forms one of the most interesting classes of objects formed in fresh water.

Fresh-water Polyzoa are very generally distributed in the ponds and slow-moving streams, and lake shores above Ottawa, and the wonder is that their beauty has not long ago been found out. No systematic study of the Fresh-water Polyzoa has as yet been made in this district.

Dr A. C. Stokes in his "Aquatic Microscopy" p. 237 makes the following statement. "Their beauty is so exquisite, so delicate, so refined in its comeliness and grace, that no description could be too extravagant when applied to the charming little creatures. Nature was never in a better mood than when she began the developement of the Polyzoa, so she fashioned them with care."

Seven genera of Fresh-water Polyzoa have been found and described in the United States of America, as follows:—

Plumatella, Fredericella, Paludicella, Cristatella, Pectinatella, Urnatella, Lophopus.

In America, Lophopus has only been recorded from two localities having been found in California, and at Trenton, N. J.

Polyzoa are usually found attached to some submerged object, a piece of board, weed, stump or stone. An exception to this is the species referred to, Cristatella, which moves more or less slowly from place to place.

Young zooids after leaving the egg swim freely for a short time, and then become attached to some object, to which they then adhere till death. Certain forms prefer the sunlight while others are only found in shady places and others still, thrive on the under or dark side of sticks; boards or stones.

Description of species found at Ottawa.

(1) PLUMATELLA REPENS, L.

The colonies of *Plumatella* are formed of sheaths or coverings called *cœnœcia* which the polypides secrete, and appear as brownish tubes branching like tiny trees or seaweeds, extending over a surface measuring sometimes several square feet. There are two modes of attachment in these colonies: (*a*) where the lower portion of the stem is fixed and the remainder of the branch floats freely: (*b*) when the whole branch is closely adherent or creeping on the submerged object.

At the extremity of each branch a polypide protrudes, exposing the lophophore or plume-like organ (hence the name *Plumatella*). The polypides quickly retreat on the slightest alarm or disturbance, and remain in their sheaths until quite satisfied that the cause is removed.

"The body of the polypide* is a transparent membraneous sac with a lophophore (horse-shoe shaped in this genus), on which are arranged the tentacles. Each tentacle is capable of independent motion, is ciliated on both sides, and is the only means the polypide has of receiving impressions. The mouth is at the fore end, the rest of the body being concealed in a brown sheath or *cœnœcium*. The mouth has on one border a tongue-like organ called the *Epistome*, which can close the opening, and prevent the escape of food. Extending from the mouth to the stomach is the *œsophagus*. The stomach is a widened tube, conspicuous by its contents. It is suspended in the hollow body, and is bathed by a colorless fluid which fills the body cavity and extends to the hollow tentacles. The stomach is followed by a tubular intestine which curves forward, opening on the lophophore." The polypide has no heart nor circulatory system. The body has a beautifully developed muscular system, which enables it to move freely and rapidly. One set of muscles everts the body, another set is used in expanding the various tentacles of the lophophore; and another set supports the body

* Dr. A. C. Stokes in "Aquatic Microscopy" p. 242.

while the lophophore is thus expanded. Another set of muscles assist in closing the opening of the coenœcium, when the body is withdrawn ; or are attached to the stomach, which assist that organ in its functions.

Plumatella repens feeds on infusoria and small algæ which are drawn into the mouth by the currents created by the cilia attached to the tentacles. These cilia have an upward movement on one side of the tentacles and a downward one on the other.

Reproduction occurs in two modes : (*a*) by budding, (*b*) by statoblasts or winter eggs. Reproduction by budding merely increases the number of individuals in each colony, whilst reproduction by statoblasts assists in forming new colonies.

Statoblasts are flattened discs, round or oval, formed within the body, and escape after the death of the polypide when the whole colony disintegrates. Statoblasts are dark brown in colour and have an outer ring called the *Annulus*, formed of hexagonal cells. Others have barbed hooks along the margin. Statoblasts are excellent criteria for distinguishing one genus from another, or the different species of each genus.

Locality and habitat. Abundant on logs, sticks, stones in Patterson's Creek and in pits at Odell's Brick Works where the largest colony observed was found on a piece of board five feet long and ten inches wide entirely covering the under surface with innumerable colonies of this species. August 1898.

FREDERICELLA REGINA, Leidy.

This species is found growing with the preceding, which, it resembles somewhat in appearance. It is dendritic in form, of a light brown color, and usually attached by the trunk, the branches being mostly free. It covers a smaller area than *Plumatella* and is readily distinguished from it by its characteristic circular or oval lophophore, that of the former being horse-shoe-shaped. The tentacles are few in number, generally nineteen, and arranged on the crest in a single row. Contrary to the statement made by Hyatt and other workers on Polyzoa, *Fredericella regina* found at Ottawa was found in nearly every

case in the sunlight instead of in the shade, attached to submerged or floating weeds. The statoflasts of *Fredericella* are distinguished from those of all others in having no annulus. In shape they are veiniform, and are destitute of spines.

Locality and habitat. Very common in the Rideau River above Hog's Back in a small bay west side of the locks, attached to stems of *Myriophyllum spicatum*; also in Patterson's Creek near Elgin street bridge on *Heteranthera*. Also obtained during the winter on stems of *Anacharis Canadensis* from clay pits in Odell's Brick Works, Ottawa East, July, 1898.

PALUDICELLA EHRENBERGII, Van Beneden.

"These colonies may always be distinguished from all other tube-making Polyzoa by their jointed appearance, each cell being club-shaped. The colonies are irregularly branched and are built up of a single row of cells placed end to end, the narrow end or handle of the club being attached to the broad end of the cell immediately behind it. The opening through which the polypide protrudes its circular lophophore is at one side of the broad end of each cell and near the top."* No statoblasts of *Paludicella* have been discovered; reproduction is effected by budding. Unlike other genera of Fresh-water Polyzoa, it has Hibernacula or winter quarters for the resting buds, which correspond with the statoblasts of other genera. "At the approach of spring the bud becomes covered with a horny sheath, thus preserving it till the following spring." The bud then splits vertically after which the young is developed in the usual way.† The tentacles of this genus are sixteen.

Locality and habitat. This is by far the rarest form of Fresh Water Polyzoa found at Ottawa. Three colonies were obtained on stones only. In the little rapids above Billings' Bridge, Rideau River; also at Hurdmans Bridge, same stream; and in the shallow above the rapids at the Canadian Pacific Ry., bridge, Rideau River, Aug. 1898.

*Dr. A. C. Stockes "Aquatic Microscopy" p. 249.

†"Ponds and Rock Pools" p. 132. Scherren Hy.

CRISTATELLA IDÆ, Leidy.

Colonies of this genus are oval in shape, flat on the under side and convex on the upper side, with the polypides in rows all around, except along the centre of adult specimens, where statoblasts are to be seen. Individuals of this genus after emerging from the statoblast, form a small lump or mass of jelly semi-transparent in colour, and usually pear-shaped. In the adult form it is not unlike a hairy caterpillar, owing to the presence of numerous buds which proceed from the ectoderm. By budding, the colony grows rapidly in length (but not in breadth) till it reaches a length of two or three inches, when it measures a quarter of an inch in breadth. A specimen found in the Rideau canal on a sunken barge measured four inches in length.

This form differs from all others in two particulars, (*a*) in having powers of locomotion; (*b*) in preferring sunlight during life. *Cristatella* moves very slowly, covering a length of about one inch per day. By carefully marking off certain spaces on the object on which it rests, the distance travelled can easily be ascertained. The polypide of this species has many points of resemblance to *Plumatella*. The tentacles are about eighty in number. The statoblasts of *Cristatella* consist of rounded flattened discs, which have the margin covered with two rows of doubly barbed hooks resembling anchors.

Locality and habitat. Occurs on stones at little rapids on Rideau River above Billings' Bridge; also on stones at Hurdman's Bridge, Rideau River; in Patterson's Creek, Ottawa, between the Bank street and Elgin street bridges on blades of submerged grass; also on beam of a sunken barge on Rideau canal at Bronson's wharf. October 1898.

PECTINATELLA MAGNIFICA Leidy.

"The reproductive and vital energies of the group reach their climax in the voluptuous beauty and endless multiplication of the cœnœcia in *Pectinatella*."* "The colonies of this class

*Hyatt "Observations on Polyzoa" p. 12.

are surrounded by a thick jelly-like material, from which the polypides protrude, and into which they retreat. These jelly-masses are usually colourless and semi-transparent, or tinged a pale red. They are to be found adherent to sticks or any water-soaked object, and vary in size from half an inch to several feet in diameter." "The jelly is formed by the polypides, and is in reality a collection of protective cells or chambers, the huge masses often being the result of the increase in the numbers of the polypides inhabiting them A single polypide begins the cluster, it becomes two by a process of budding, the bud finally becoming another polypide, secreting more jelly, budding in its turn, so that the community may in the end contain numberless members. The colour of the polypides is usually a pale red or flesh tint,"* "and being in countless profusion in the jelly-mass, are crowded together and become compressed into irregular hexagons in outline." The lophophore is horseshoe-shaped, having from sixty to eighty tentacles. Towards the end of summer the polypides mature and die, leaving the statoblasts adhering to the surface of the jelly-mass. These statoblasts are often in such large numbers as to be conspicuous to the eye. They have a single row of barbed hooks, averaging fifteen in number, proceeding from the outer edge of the annulus. Mature statoblasts of *Pectinatella* and *Cristatella* while in the body of the polypide, are inclosed in a transparent matrix or yolk. Some statoblasts of *P. magnifica* collected from the Rideau canal in September, '98, hatched in an aquarium, in March, 1899, but only lived two weeks.

Locality and habitat. On a submerged stump in Patterson's Creek (Rideau canal) near Elgin street bridge. Sept. 1898.

*Stockes "Aquatic Microscopy," pp. 238-240.

REVIEWS.

THE GOLD MEASURES OF NOVA SCOTIA AND DEEP MINING, by E. R. Faribault, B. A. Sc., Geol. Survey of Canada.—11 pp. with two maps and a number of illustrative sections. Paper read before the Canadian Mining Institute, March, 1899. In this very valuable addition to the literature of Economic Geology Mr. Faribault presents in a most concise and readable form his conclusions as to the mode of occurrence of gold in Nova Scotia. Dealing first with the extent of the gold measures, Mr. Faribault estimates that they cover 5,000 square miles. They consist of an upper or state group, two miles in thickness and a lower or quartzite group, 3 miles in thickness and are probably of lower cambrian age. Since their deposition on a sea floor they have been very uniformly folded into a series of anticlines and synclines roughly parallel with the coast line. The auriferous quartz veins have been deposited at the summit of these anticlines and along certain lines on either side of and parallel to the axes and their deposition has been due to the loosening and opening up of the strata along the planes of sedimentation. Though the original bedding in these rocks is masked by a uniform cleavage subsequently developed, Mr. Faribault has been able, by close structural work in the field, to fix accurately the anticlines and twenty-one domes or cross undulations affecting the anticlines and defining the occurrence of payable reefs. Although granitic intrusions are common they have occurred subsequent to the filling of the gold veins and in no way affect their richness. Mr. Faribault's theories as to the position and extent of the pay steaks and his advice as to the lines along which deep mining should be prosecuted must be of the greatest value to the practical miner, and his comparison of the Nova Scotia district with that of Bendigo, Australia in the matter of deep mining is most instructive and encouraging. The paper altogether is most valuable and exemplifies in the clearest manner the necessity of good structural work, carried out in a scientific way, in the development of a mining district.

WACHSMUTH AND SPRINGER'S MONOGRAPH ON CRINOIDS.

In his delightful review* of Wachsmuth and Springer's monograph on Crinoids" Prof. F. A. Bather proposes that for all crinoids, pinnulate or non-pinnulate, in connection with the successive series of brachials, the following terms be used, urging that all writers on crinoids should agree in this matter. They are as follows: Primibrachs (I Br.); Secundibrachs (II Br.); Tertibrachs (III Br.); Quartibrachs (IV Br.). It is to be hoped that the above terms will be employed by future writers of descriptions of crinoids. The concession made by Prof Bather in this matter not only deserves commendation but tends to establish uniformity in terminology. Prof. Bather further discusses the morphological part of the Monograph, the quinquepartite character of stems of the larger number of Lower Palæozoic crinoidea, the cirri of Palæozoic crinoids, radials and compound radials, basals and infra basals, the course of the axial nerve cords in certain crinoids and the "Law of Wachsmuth and Springer" as interpreted and proposed by Prof. Bather, the fusion of basals as well as notes on the corms, ovals and tubes.

The last notice of Prof. Bather deals with the System Camerata to which is appended an obituary notice of Prof. Wachsmuth with the Bibliography of that writer.

GEOLOGICA BIBLIOGRAPHIA.

The Geological Survey of Belgium has recently issued a series of very important volumes entitled *Bibliographia Geologica*. These volumes are prepared according to the approved decimal classification of Melvil Dewey and form part 549-559 of the *Bibliographia Universalis* of Dr. G. Simoons. Michel Mourlon of Brussels, director of the Geological Survey of Belgium, has charge of the *Bibliographia Geologica* and it is a work of paramount importance to working geologists. The volumes contain about 400 pages each and give some 6,000 titles of publications in geology, palæontology, mineralogy and prehistoric a chæology. These may be obtained, Mons. Mourlon writes, from Hayez, 112, Louvain street, Brussels, Belgium.

*F. A. Bather, in Geol. Mag. New Series, Dec. IV, Vol. V, London, Eng., 1898.

PALÆONTOLOGICAL NOTES.

The following is a brief enumeration of the leading palæontological notes and references bearing on Canada, and contained in the "*Summary report of the Geological Survey department for 1898*" by the Director, Dr. Dawson.

- (a) On mammoth and musk-ox remains from the "Saskatchewan" gold-bearing gravels of the Edmonton district, Alberta, by Dr. G. M. Dawson, pp. 19 and 20.
- (b) List of fossil organic remains from the "altered gray slates with shaly bands" from six miles west of Canterbury station along the St. Andrews and Woodstock branch of the Canadian Pacific Railway. Silurian species recognised by Dr. H. M. Ami, p. 137.
- (c) Silurian fossils recorded from Burnt Island, Manitoulin Island, Lake Huron the nearest outcrop of fossiliferous limestone to the Duck Islands, by H. M. Ami, p. 179.
- (d) Notes on general results obtained from a palæontological survey of numerous outcrops in the counties of Colchester, Cumberland, Pictou, Antigonish, Kings and Hauts in Nova Scotia, by H. M. Ami, pp. 180-182.
- (e) Reptilian remains from the Belly river and Laramie formations of the North West Territories of Canada, by Mr. L. M. Lambe, pp. 184-190.

H. M. AMI.

Ottawa June, 1899.

CLUB EXCURSION.

The first general excursion of the club was to Chelsea on June 3rd; between 250 and 300 members and their friends were in attendance. The leaders present were: Geology, Mr. W. J. Wilson; Botany, Mr. D. A. Campbell and Mr. J. M. Macoun; Entomology, Dr. Jas. Fletcher; Conchology, Mr. F. R. Latchford; Ornithology, Miss Harmer and Mr. W. T. Macoun; Zoology, Prof. Macoun, Mr. A. Halkett and Mr. W. S. Odell. The president's prize—Miss Lounsberry's "A Guide to the Wild Flowers"—for the largest collection of plants was won by Miss Kingston, while Miss D. Fletcher secured the Club's prize—Mrs. Parson's "How to Know Ferns"—for the greatest number of named species. Addresses were delivered at the close of the afternoon by Prof. Macoun, Dr. Fletcher and Mr. Halkett.

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No. 5.

EXTRA LIMITAL INSECTS FOUND AT OTTAWA.

By W. HAGUE HARRINGTON, F. R. S. C.

Read 21st February, 1899.

The tracing out of the geographical distribution of plants and animals is one of the most important and, at the same time, one of the most fascinating studies of a naturalist. In the investigation of the complex problems which are therein encountered, a society such as the Ottawa Field-Naturalists' Club may render very valuable assistance, by the publication of accurate floral and faunal lists, and of exact records of the occurrence and life histories of the various species studied by its members. The commonplace Ottawa citizen, especially if he be a property holder, observes with pride and pleasure the steady expansion of the city, and the corresponding increase of its population. The Ottawa naturalist, on the contrary, notes with deep regret his former haunts invaded and laid waste, and monotonous blocks of buildings rapidly covering the ground where so recently the forest flourished. The so-called march of improvement unfortunately means to him the disappearance of his happy hunting grounds; the cutting down of woodland monarchs, the draining of lush swamps and the production of barren uniformity where erstwhile plentiful diversity obtained.

The evolution of our country from a forest region to an agricultural and commercial district, not only in the immediate neighbourhood but over the areas spreading oceanward in every direction, produces important and easily recognized alterations in our flora and fauna.

As the untutored savage vanishes before the civilization for which he is not prepared, so many of our native animals and

plants disappear and are replaced by intruders from afar. The primeval forest perishes ; its larger denizens are slaughtered or driven away, and the plants and animals that remain are such as can best adapt themselves to the changed conditions of the land.

Many persons may recognize these self-assertive changes and still not stop to think that our insect fauna and even those smaller forms of life that delight the microscopist are also similarly affected by the far-spread improvements or disturbances of the landscape.

Yet a moment's consideration will suffice to show that such is actually the result. An insect may be able to exist only upon a single species of plant, and the destruction of that host-plant involves the disappearance of its guest. Or, the actual change in physical conditions may equally well bring about a change in the insect life. The draining of a swamp and its gradual conversion into dry woods or open fields necessitate the withdrawal of those species which require a cold moist habitat, and correspondingly tend to create conditions favourable for forms from more southern localities. These changes go on steadily year after year whether we notice them or not, and the destruction of the forest, the cultivation of the land, the pasturing of flocks and herds, and ever expanding commerce accelerate the alterations in insect population. Our indigenous insects are supplanted by prolific and vigorous forms from lands where evolution has fitted them to successfully overcome the disadvantages of man's society and solicitudes. The species whose food plants are destroyed, and which are unable to assimilate the new order of vegetation, disappear, accompanied by many of their parasitic and predatory associates. Replacing them come insects from near or afar, especially those thoroughly domesticated forms which follow man wherever he pitches his tent or builds his shack.

In a discussion of the insect population as it now appears to our collectors, a difficulty arises at the start in our inability, in many instances, to distinguish between the descendants of the

original fauna and late intruders. A considerable proportion of our insects belongs to a boreal fauna which is more or less circumpolar in its distribution, and of which many species pass with little or no change of facies through the northern regions of Europe, Asia and America. In regard to such forms it is consequently often impossible to declare positively whether they belong to the original fauna or have been introduced since the colonization of the country. There are, however, many species whose progress hither can be retraced successfully by the records in entomological or agricultural publications. The times and methods of their arrival are varied and numerous, and any full discussion of them would be long, and to many wearisome. Some, our settlers have carried among their goods and chattels or even upon their persons, while many have come with their beasts and fowls. Other forms living in less close communion with mankind have worked their own passage hither afoot or awing. Some come borne across long leagues of land and water by the winds; a few possibly upon the floods, although as our streams flow usually to the east and south the currents are mainly against the oncomers. In these latter days of swift and universal transit, when Ottawa is a great and growing railway centre, they hasten to us both by freight and passenger trains. They are introduced with our animals, our plants, our provisions, with merchandise of divers sorts, and in ways innumerable and unexpected.

A large proportion come as immigrants to occupy and possess the land and to multiply their kind therein; others are tourist visitors making summer excursions which terminate generally in their premature death through cold or the lack of proper nourishment.

In addition to the species which have been introduced from abroad, we may consider perhaps as extra-limital insects certain indigenous forms which occur but rarely, or under special conditions. Such for example are the butterflies *Thecla Augustus* Kirby, *Thecla tricoloris* Hub. and *Chionobas Jutta*. These butterflies have been captured in the Mer Bleue, but are species

having their metropolis, or region best suited to their full and regular development, much further northward. Examples of such forms occur in little out-lying colonies, whose ancestors found in their prehistoric wanderings a suitable habitat, or survived in more and more restricted isolation as the surrounding country became unfitted through climatic changes for the continuance of the species.

Without waiting to consider such, all too-common, insects as the cheerful House-fly, the industrious Clothes-moth, the "Jumpem-quick" and the "Walkem-slow," with numerous other crawling and creeping domestic pets and pests which, like the poor, are always with us, mention will be made of a few of the more noticeable species which within more or less recent years have come hither as permanent residents or as occasional visitors.

Commencing with the Lepidoptera there is, familiar to everyone, the common White Cabbage Butterfly, *Pieris Rapa* Linn, the caterpillars of which devour voraciously the succulent cabbages and cauliflowers of the kitchen-garden, or the fragrant mignonette of the flower plots. This butterfly came to America by way of Quebec about the year 1859 and has since that date become widely distributed across the continent. As the Europeans dispossessed the native Americans so this immigrant from across the Atlantic has become our most common species and has almost supplanted our native white butterfly, *Pieris oleracea* Har, and the last Entomological News (vol. x, p. 46) records a similar displacement of the species as far west as Salt Lake City.

An occasional visitor from across the line is *Aletia argillacea* Hub., the famous Cotton Moth of the Southern States, whose numerous and industrious progeny reduce by several million dollars annually the product of the plant from which is obtained such an important article of commerce, and one so necessary to the comfort of mankind. The moth is of moderate size, expanding scarcely one and one-half inches, and is soberly coloured; the front wings tawny or olivaceous with a few irregular trans-

verse markings and a small oval eye-spot; the hind wings are pale greyish; when at rest it is quite inconspicuous. Dr. Riley in his report upon Cotton Insects, has stated that this species "is probably indigenous to South America and is an introduced insect in the United States," where its appearance was first recorded in 1793. For a century it has levied toll, reaching thirty million dollars in some years, upon the cotton plantations, but fortunately its caterpillars will not feed upon any other plant, and its depredations are thus confined to the Cotton Belt. Unlike the larvae, the moths are more catholic in their tastes especially in the matter of sweets, and not content with rifling the nectaries of different plants they do considerable injury to fruits. Dr. Riley says that:—"Frequently the fig crop is completely destroyed in some sections of the cotton belt, as is also the August crop of peaches. The moths have also been known to feed on apples, grapes, melons and the jujube." This aptitude for a more savory diet than cotton permits the moths to earn a living almost anywhere, and accounts perhaps for their occasional appearance so many hundred miles from the scenes of their earlier labours. It is, however, possible that the specimens which occur here, perfectly fresh and unrubbed, have been reared upon some other plant in more northerly regions. In October, 1880, the moths occurred quite abundantly in this city; I captured many individuals at rest upon different buildings, and the following year I found it both at Hull and Aylmer.

While these autumn arrivals of *Aletia* do not survive our winters nor propagate their species here, there is another resident of the cotton fields that apparently is able to do so and which may therefore become a permanent and unwelcome colonist. This is a somewhat large moth, known as the Boll worm, *Heliothus armigera* Hub., which in portions of the cotton-growing region is almost more dreaded than the Cotton Moth itself. The species is distributed over a large portion of the world and has been observed in Canada for a score of years. It has a varied menu, including such very important plants as corn and tomatoes. In the ears of the former and the fruit of the latter the cater-

pillars burrow as they do in the cotton bolls, and to some people the idea of a large fat grub busily at work within would spoil the taste of the largest and gayest tomato.

Of the many enemies of the fruit grower, one has been so long with us that we almost forget that it is not native to the soil. This is the destructive Codling Moth, *Carpocapsa pomonella*, recognized in America as early as 1819 and whose progeny one often finds snugly domiciled in the rosy-cheeked apple when it is eaten, resulting at times in the biter being bitten. This is by no means an insect new to science as wormy apples as said to be referred to in literature two thousand years old; when the fruit was presumably much less luscious and tempting than it is at present. Indeed we may reasonably assume that the first green apples with which the children of the cave-dwellers sharpened their teeth, already harboured the retiring and gentle grub.

Occasionally specimens have been captured in Ottawa of an unusually large and handsome moth named *Erebus odora*. The occurrence of this fine insect so far north is both remarkable and puzzling, as it is an inhabitant of the West Indies and Central America, and it seems scarcely possible that individuals, even aided by favourable winds, could accomplish such long flights without becoming very much travel-worn; yet the specimens observed have been in good condition.

Of Hymenoptera quite a number of species have come to us; of which probably the most important is the Honey Bee, *Apis mellifica* L., who labours during the hot Canadian summers to increase the sweets of our existence, but whose manifest virtues we will not stop to discuss. There are also several obnoxious forms belonging to the group known as Saw-flies, which have caterpillar-like larvæ. The blushing rose, that universal symbol of beauty and fragrance, among the many foes that stale and wither its infinite variety numbers three species of saw-flies, all of which, there is good reason to believe, are from over the ocean. *Monostegia rose* Harris has been known in America since 1841. *Emphytus cinctus* Linn., since 1867 and *Cladius fectinicornis*

Fourc. since 1880. A few years ago I had a solitary rosebush, and not much of a rosebush either, which nourished during the summer all three species. All growers and lovers of small fruits know only too well the worms which defoliate so rapidly the currant and gooseberry bushes. These also are the larvæ of a European saw-fly, *Nematus ribesii* Curtis, and the species is one of our earliest immigrants, making itself quite at home and prevailing in spite of hellebore and other applications.

Of insects that have made themselves conspicuous in recent years by their works of destruction *Nematus erichsonii* Hartig, holds a leading place, from the wide spread devastation it has wrought in the tamarac forests from the Atlantic westward. The Larch saw-fly is almost undoubtedly an importation from Europe, and, matriculating at Harvard in 1880 on European larches, it swept rapidly through New England and was reported three years later as causing serious injury to our native larches in the Province of Quebec. In 1885 it was found at work in this district and by 1890 it had overspread the whole country from historic Louisburg to points far west and north of Ottawa. The tamarac forests suffered as if a fire had overrun them, and it is difficult to estimate the loss that this insect has caused to the country. It still abides with us, ready each year to attack any trees that still struggle for existence and put forth a feeble foliage, or such young larches as may be found growing up.

A small black saw-fly, *Fenusa varipes* appeared a few years ago at the Central Experimental Farm upon imported Alders, of which the foliage was much disfigured by the larvæ mining in the leaves. The insects spread to the alders in Dow's swamp, but the species does not appear to have established itself.

Closely allied to the saw-flies is *Cephus pygmaeus* Linn., the larvæ of which burrow in the stems of wheat. It occurred here some years ago, but has not since been observed.

Of Diptera can only be mentioned a species which of recent years has become notorious, viz., the Horn-fly, *Hamato-bia serrata* Rob.-Desv., first noted in America in 1887 and in Canada in 1892. It receives its name from its habit of massing

at certain times upon the base of the horns of cattle, and it seriously injures the cattle through the irritation caused by its persistent biting and blood-sucking. Turning to the Coleoptera we find an insect which is more generally known and persecuted than even the Cabbage Butterfly. This is the Colorado Potato-beetle, *Doryphora decemlineata* Say, a species from the wild and woolly west, which has fluttered its pink wings in heavy flight from the Rocky Mountains to the Atlantic surges. So great has been its voracity that its yellow coat with black stripes is as much detested as if it covered a convict with two instead of six legs. About the year 1820 the celebrated entomologist Say, otherwise an estimable gentleman, had the misfortune to discover this marauder and introduce him to the public. In the solitude of his native wilds he subsisted in scanty numbers upon a wild *Solanum*, but when he formed the acquaintance of the pioneer farmers some years later, he made himself quite at home in the potato-field and increased amazingly, until his offspring were forced to journey abroad in search of fresh fields to conquer. A few days ago there might still be seen in the rooms of the Ottawa Literary and Scientific Society the first potato-bugs received in Ottawa, which were then exhibited as interesting curiosities at one of the soirees of the old Nat. Hist. Society of Ottawa. They were in good spirits, although dead, but living examples soon followed them, whose descendants remain with us unto this day, in spite of unfriendly treatment and a diet of Paris green.

Some years ago Mr. Scrim found that in his rose-houses the plants were suffering greatly from the attacks of some beetle, and upon investigation we found that the species was *Aranigus Fulleri* Horn, a snout-beetle commonly known as Fuller's Rose-beetle. The larvæ were in great abundance feeding upon the rootlets and many of the valuable plants were destroyed. Energetic and effectual measures were taken to destroy them and, so far as known, there has been no subsequent infestation. Nor does the beetle appear to be established at any point in

Canada, although it is an American species, and for a score of years has been a serious pest in New York and other states.

Within three or four years our Coleoptera have been augmented by two European beetles which fortunately are not obnoxious, but which have spread and multiplied with great rapidity. Ten years ago *Sphaeridium scarabaeoides* L., had only once been recorded from Canada, but since then it has rapidly increased and has become apparently fully established. The late Mr. Caulfield of Montreal about 1886 sent to me specimens of *Aphodius prodromus* Brahm. collected by him in that city. The beetle has now become one of our commonest species, and several introduced species of the same genus are also abundant (*fossor*, *inquinatus*, *fmctarius*, *granarius*, etc.)

The foregoing illustrations will have shown that it would require a very extended list to enumerate all the additions that from year to year have been made to the original insect life of this region, so in conclusion will be stated merely two generalizations which this consideration of the subject seems to establish.

First ; that all our most attractive insects, such as the gaily-painted butterflies and moths, the flashing dragon-flies in "sapphire mail" and the beetles of varied shapes and colours, belong to the indigenous fauna, and that, with the exception of some aggressive diptera such as deer-flies, black flies and mosquitoes, few of the members of that fauna have proved to be very obnoxious or serious pests.

Second ; That nearly all the common and destructive insects, against which our farmers, fruit-growers and gardeners have to wage persistent and costly warfare, have been introduced at various times from Europe, and that these species, through the absence of the parasites and other influences which keep them in check in their original habitat, often multiply with startling rapidity and occasion continual and grievous losses to our community.

ORNITHOLOGICAL NOTES.

Edited by W. T. Macoun.

After the arrivals of the birds have been recorded there are usually few other notes taken during the season. There is so much to be learned about the habits of our birds that it is surprising that more young people do not become interested in them. Many a pleasant hour might be spent during the holidays in watching birds and taking notes on what is observed. Very little information is received regarding the nesting of birds. Are boys becoming lazy or has the bicycle greater charms than the woods? How few really desire to know more about birds.

BIRD NOTES FOR MAY.

1899.
 May 18—BLACKBURNIAN WARBLER, *Dendroica blackburniae*. Mr. George K. White.
 18—BAY-BREASTED WARBLER, *Dendroica castanea*. Mr. White.
 18—NASHVILLE WARBLER, *Helminthophila ruficapilla*. Mr. White.
 18—TENNESSEE WARBLER, *Helminthophila peregrina*. Mr. White.
 19—CAPE MAY WARBLER, *Dendroica tigrina*. Mr. White.
 19—BLACK AND YELLOW WARBLER, *Dendroica maculosa*. Mr. White.
 20—WILSON'S THRUSH, *Turdus fuscescens*. Mr. W. A. D. Lees.
 20—MARYLAND YELLOWTHROAT, *Geothlypis trichas*. Mr. Lees.
 20—RED-SHOULDERED HAWK, *Buteo lineatus*. Mr. Lees.
 20—WILSON'S WARBLER, *Sylvania pusilla*. Mr. White.
 20—CEDAR WAXWING, *Ampelis cedrorum*. F. N. Sub Excursionists; May 21st, Mr. White.
 21—RUBY-THROATED HUMMINGBIRD, *Trochilus colubris*. Mr. White.
 21—BLACK-POLL WARBLER, *Dendroica striata*. Mr. White.
 23—NIGHT HAWK, *Chordeiles virginianus*. Mr. Lees.
 24—BLACK-THROATED BLUE WARBLER, *Dendroica caerulescens*. Mr. White.
 25—WOOD PEWEE, *Contopus virens*. Mr. Lees.
 25—TRAILL'S FLYCATCHER, *Empidonax pusillus traillii*. Mr. Lees.
 26—VIRGINIA RAIL, *Rallus virginianus*. Mr. Lees.
 28—CANADIAN FLYCATCHING WARBLER, *Sylvania Canadensis*. Mr. White.

ERRATA: The PECTORAL SANDPIPER was seen by Mr. White on 30th April, not by Mr. Lees. The bird recorded as AMERICAN PIPIT seen by Mr. Lees on 13th April was not that species, but the WATER THRUSH, *Seiurus noveboracensis*.

Young bronzed grackles were able to fly on 31st May, also young robins. Young song-sparrows were just leaving the nest 24th May.

On 21st May hermit thrush had three eggs in nest. Summer Warbler had three eggs in nest on 12th June.

On 24th May, saw a pair of herring gulls at Lake of Islands, Gatineau. They appeared to have a nest in that vicinity. Also saw Myrtle Warbler, but was unable to find nest. G. R. W.

Three spotted sandpipers' nests were found at the Experimental Farm during the month of June. All of these were on high ground a long distance from water. One nest was about half a mile from the water. Nests of the bay-winged bunting are also numerous on the lawns in the Arboretum during this month. All of those found had eggs in them. W. T. M.

Four humming-birds' nests have been found in this district this year, one in an ash tree, the others in conifers.

Miss J. M. Ballantyne sends the following note on birds seen at Cumberland during the excursion of the 15th inst: "Cumberland woods on the hillside at the back of the village proved an exceptionally interesting place for the observation of bird life. Twenty-two species were identified there, while several others were seen on or about the shore.

The American Goldfinches were numerous; their notes and those of the Red-eyed Vireo might be heard almost constantly during the day. Most of the birds seen were common to our city parks or gardens. The Red-breasted Grosbeak, Redstart, and White-breasted Nuthatch are less frequently seen at Ottawa at this season of the year."

We are indebted to Mr. S. Osborne Scott and Mr. Bedson, Winnipeg, Man., for the following notes on birds observed at Winnipeg. It is interesting to compare the dates of arrival of birds there with some species at Ottawa.

1898.

Nov. 24—SNOWBIRDS, which stayed until after Christmas, then disappeared until Feb. 26, and were gone again before the middle of April.

1899.

March 9—PRAIRIE HORNED LARK—This bird breeds here.

- April 6—DOWNY WOODPECKER.
 6—CHICKADEE. Breeds.
 6—CROWS seen flying in flocks.
 6—HOUSE SPARROWS re-building their nests.
 7—WHITE-RUMPED SHRIKE. Breeds.
 9—REDPOLL.
 9—SLATE-COLOURED JUNCO.
 10—AMERICAN GOLDFINCH. Breeds.
 10—WESTERN RED-TAILED HAWK. Breeds.
 13—MEADOW LARK. Breeds.
 14—ROBIN. Breeds.
 15—NIGHT HAWK. Breeds.
 15—MALLARD. Breeds.
 15—WOOD DUCK. Breeds.
 15—PINTAIL.
 22—Cold spell with snow. No more birds arrived for some time. Snow seemed to drive away some of those which had already arrived.
 23—Fine again.
 23—SONG SPARROW. Breeds.
 23—HOUSE WREN. Breeds.
 23—FLICKER.—Breeds.
 23—RED WOODPECKER. Breeds.
 23—HOARY REDPOLL.
 26—KILDEER PLOVER. Breeds.
 26—PURPLE MARTIN. Becoming common. Breeds.
 27—SPARROW HAWK. Breeds.
 27—PINE GROSBEAK.
 27—CEDAR WAXWING.
 27—WOOD PEWEE. Breeds.
 28—GREAT CRESTED FLYCATCHER. Breeds.
- May 1—SPOTTED SANDPIPER
 4—UPLAND PLOVER.
 6—COWBIRDS.
 6—This evening there was a heavy thunder storm with a strong wind from the south. At about 11.30 p. m. the wind was at its height. Many birds going north were driven against the college and some stopped in the pond in front of it, among which were Water-hens, Water-rails, Gulls, Snipe and Yellowlegs.
 7—KINGBIRD. Breeds.
 7—WHITE-BREASTED NUTHATCH. Breeds.

- 7—FOX SPARROW. Breeds.
 8—Flock of from 30 to 40 Evening Grosbeaks in tall maples; going north. Breeds.
 8—WHITE-THROATED SPARROW. Breeds.
 8—WHITE-CROWNED SPARROW. Breeds.
 8—CHIPPING SPARROW. Breeds.
 10—FIELD SPARROW. Breeds.
 12—BLACK-THROATED GREEN WARBLER.
 18—PINE WARBLER.
 19—CHIMNEY SWIFT. Breeds.
 20—BALTIMORE ORIOLE. Breeds. This bird is becoming much more common than it used to be.
 20—BLUEBIRD. Breeds. This bird is becoming much scarcer than it used to be. There was only one breeding in this locality where there used to be twenty.
 21—TREE SWALLOW. Breeds.
 22—BLACKBURNIAN WARBLER. Breeds.
 23—CATBIRD. Breeds.
 24.—AMERICAN BITTERN. Breeds.
 25—MOURNING DOVE. Breeds.

ED. NOTE: A few other birds mentioned in this list are known to breed in Manitoba but the list is printed as received from Mr. Scott.

PRELIMINARY DESCRIPTION OF A NEW CARIBOU

By ERNEST SETON-THOMPSON.

It has long been known among sportsmen that the caribou of the western mountains differed strikingly from those found in the Barren Grounds, the northern woodlands, or Newfoundland. The fine specimen brought from British Columbia by Dr. Geo. M. Dawson, of the Canadian Geological Survey, has given me the opportunity of satisfying myself regarding the alleged differences. These are very obvious, and are moreover coupled with the fact that it is geographically isolated from its near ally, the *Rangifer Caribou*, so that I feel justified in giving it full specific rank.

RANGIFER MONTANUS, sp. nov.

The Mountain Caribou.

Chief characters: Its very dark colour and its great size; in the latter particular it is said to equal, or even exceed the

R. terra-novae. The specimen brought by Dr. Dawson is now mounted in the museum of the Canadian Geological Survey at Ottawa. And I have to thank that gentleman for the privilege of describing this fine animal.

This specimen, which I make the type of the new species, is a male, and was taken in the Illecillewaet watershed, near Revelstoke, Selkirk Range, B.C., in 1889.

It stands $46\frac{1}{2}$ inches high at the withers; is 95 inches from tip of the nose to the root of the tail; the tail is 5 inches long; the head from nose to occiput $19\frac{3}{4}$, the hind foot 26 inches; the ear $7\frac{1}{2}$ inches.

The general colour is a deep umber brown, very glossy, and darkening nearly to black on the lower parts of the legs.

The neck is dull greyish white, also the underside of the tail, the buttocks, lips and belly. Along the ribs on each side is a greyish patch a little lighter than the surrounding brown.

The white fringe above each hoof is shining white and *very narrow*.

The antlers of this specimen are not noticeably different from those of the woodland species, but in general those of the Mountain Caribou are distinguished by their great number of points, a specimen with 72 points having been recorded. They are, I believe, less massive than those of the Newfoundland species.

The species ranges or did range through the interior mountains of British Columbia, extending northward into South Eastern Alaska, eastward into the Rockies of Alberta, and southward along the higher ranges of Idaho half the length of that state. According to Lord it formerly was found along the summits of the Cascade range as far as Oregon. It does not seem to breed at all in the coast ranges of British Columbia.

So far as I can learn it is separated geographically from the woodland species by a vast caribou-less basin, running up east of the mountains as far as latitude 54° .

EXCURSION TO THE QUEEN'S PARK, AYLMER.

The second general excursion of the season under the auspices of the Club was held on Saturday afternoon, June 24th, 1899 when the Queen's Park, Aylmer, Que., was visited.

The attendance was not large, but *five* of the leaders appointed by Council were present and a profitable time was spent by those who were fortunate enough to visit this beautiful Park.

BOTANY:—In this section of the Club's work, seventy-nine species of plants were noted and recorded from the Park. They are for the most part common species. Among the most interesting plants were a series of flowering shrubs: *Ceanothus Americana*, *Prunus pumila*, *Rosa blanda*, *Corylus rostrata*, *Shepherdia Canadensis*, *Viburnum pubescens*, *Cornus paniculata*, *Carpinus Americana*, *Rhus typhina*, *Juniperus communis* and *Cratægus*. Amongst the trees were noted two kinds of oaks, *Ulmus Americana*, *Pinus Strobus*, *Thuja occidentalis*, *Abies balsamea*, *Populus balsamifera*, *P. tremuloides*, *Betula lenta*, *Tilia Americana*.

The number of plants now growing in the Park would, no doubt, far exceed that recorded on a single day by a single visit of a few of the members of the botanical section, nevertheless it would be interesting to have a complete list of the species recorded from this locality as in a few years the ground will have been so trodden as to leave but few of the more humble and modest herbaceous flowering plants that now adorn the shady nooks and pretty spots of this Park.

It is to be hoped that the pines and oaks and every tree growing within the limits of the Queen's Park will be protected, that not only their shade may be enjoyed but their beauty and characters. The Botanical branch was led by Messrs. R. B. Whyte and A. E. Attwood, M. A.

GEOLOGY.—The geology of the Queen's Park is very simple. Two geological formations are there to be seen. First, the Calcareous formation consisting of fine grained and compact magnesian or dolomitic limestones, which are at times rather

siliceous and pass upwards into very fine grained and rather thick bedded soft mudstones or shales with peculiar concretionary structure and conchoidal fracture.

The outcrop of this formation along Deschenes Lake Shore affords just sufficient material to enable the geologist to identify the horizon there represented in the stratigraphical column of formations. The occurrence of the gastropod: *Pleurotomaria gregaria*, Billings, a form characteristic of the Calceferous sand-rock of Ste. Anne and St. Eustache in the Eastern extremity of the Ottawa Palæozoic Basin where it forms part and parcel of the present (same geologically) St. Lawrence Basin, affords sufficient evidence to enable the reference to be made with a degree of accuracy.

Then the newer or Pleistocene deposits are very poorly represented in the Park, but in the Island south of the Park, on which the Lighthouse is built, are sands and gravels of post-glacial origin and made up for most part of debris of Palæozoic and Archæan rocks. The geological party was led by Mr. T. W. E. Sowter, who proved a very valuable leader and also by the President.

ARCHÆOLOGY.—Mr. Sowter informed the members present that the shore of the lake in the vicinity of the Park, especially along the line of the terminus of the Electric Railway line, was a favourite resort of the aborigines of this country and the site of an old camping ground:

One of the members of the geological section visited the Lighthouse Island opposite the Queen's Park and obtained a number of bones of the former inhabitants of this district, who had been interred in this sequestered spot. Some of the bones were found strewn along the northern and eastern shores, bleached and partly submerged, others were found in the gravels on the bluff or west side of the Island.

This district is well worth visiting and studying from an Archæological or Ethnological standpoint, and from the success which has already attended the researches of Mr. T. W. E. Sowter the club hopes to be able to chronicle very interesting result before long. H. M. A.

EXCURSION TO CUMBERLAND, ONT.

The third general excursion of the Club was held at Cumberland, a pretty village situated on the Ottawa River, Ontario side, some twenty miles below the Capital. It was the first time in the history of the Club that Cumberland had been visited and although the attendance was not large, nevertheless, those who took part or were present, all speak in glowing terms of the beauty of the view and surroundings as well as of the many interesting natural features of special value to a field naturalist. Three members of the Council and Leaders were present and considerable work done.

In Ornithology Miss Ballantyne noted the occurrence of not less than twenty-five birds during the day, whilst Miss M. Whyte prepared a list of the flowering plants noticed along the face and on the top of the escarpment south of the village and along the roadsides and shore of the Ottawa, on behalf of the Botanical section. Mr. Andrew Halkett, as Leader in general Zoology, made notes of observations on squirrels, chipmunks, slugs, millipedes and spiders, besides a number of butterflies. Amongst these were: White admiral (*Limenitis Arthemis*).

Milk-weed butterfly (*Danais Archippus*), Yellow butterfly (*Colias philodice*), White Cabbage butterfly (*Pieris rapæ*.)

Regarding the Chipmunk (*Tamias striatus*, Linn.,) Mr. Halkett writes:—"An interesting sight was a Chipmunk at his burrow which was a regular hillock with both entrance and exit. The entrance was constructed of sticks and stones."

Two Cyprinoids were secured by Mr. Halkett for examination, from a pool adjacent to the Ottawa caused by the receding of the water.

GEOLOGY.—The strata between the Ottawa river front and the top of the hill south of Cumberland afford perhaps the most perfect undisturbed and continuous section of Palæozoic rocks in the Ottawa Valley in a very compact and easily accessible form and limited space. The Calciferous, Chazy, Birds' Eye and Black river and Trenton formations were all observed and examined in their natural sequence.

The lower plateau between the hill and the river shore is occupied for the most part by the Calciferous formation and a series of strata which may be termed a transition series between the Calciferous and Chazy. The magnesian limestones and concretionary argillaceous beds such as were noted at the Queen's Park, Aylmer, crop out at this locality and are superimposed by sandy shales and marls which compose "the hill" south of Cumberland village. On the top of the hill and brow thereof, bands of a limestone full of the characteristic *Rhynchonella* (*Camarotochia*) *plena* were seen from which excellent specimens were obtained. Above this a few characteristic fossils of the Black river and Trenton formations were also noted. Above all of these and along the cultivated flats and farm lands occur the fossiliferous clays and marls of Pleistocene age. Thousands of shells of *Saxicava rugosa* occur together imbedded in a sandy clay at the foot and along the slope of the hill on the road to Ottawa on Mr. Gamble's farm. *Balanus crenatus* also occurs rarely along with the former named species.

The limestones of Lower Trenton and Black river age are well exposed along the roadside and exhibit beautiful examples of glacial striae. The majority of the markings, trend for the most part due north and south, but at times are very irregular in direction which fact indicates the oscillatory movements and shifting of the direction of the great ice sheet carrying boulders of Archaean age, many of which can be seen on the upper ledges of the Ordovician strata as they were deposited or left by the ice as it melted at the close of the glacial period. H. M. A.

NOTE.

GOOD GEOLOGICAL SECTIONS.—The Leaders of the geological section desire to draw the attention of members of the Club to the numerous excavations going on in the City for the Main Drain. These excavations afford excellent sections, and as in the case of earlier public works of the same nature when valuable notes were taken, it is hoped that records will be kept to show the character of the strata traversed in various portions of the City and afford material wherewith to lay down the boundaries of the various geological formations traversed with greater accuracy. H. M. A.

OBITUARY, O. C. MARSH.

OTHNIEL CHARLES MARSH, professor of palæontology in Yale University, New Haven, vertebrate palæontologist of the United States Geological Survey and president of the National Academy of Sciences from 1883 to 1895, a past president of the American Association for the advancement of science, corresponding member of learned and scientific societies in France, Belgium, Germany, Italy, Austria, and Denmark, died in his sixty-eighth year at his residence, New Haven, Connecticut, after a brief illness. Prof. Marsh was one of the most brilliant and distinguished palæontologists in the world.

He was educated at Yale, Berlin, Heidelberg and Breslau. He achieved a vast amount of work before he died and had in his hands a very large amount of material to describe and illustrate had the untimely hand of death not snatched him, as if in an instant, from his favourite studies and researches. Honours were showered upon him by the Institut de France, the Geological Society of London and other distinguished bodies.

Prof. Marsh crossed the Rocky Mts. twenty-one times, visited the Alps and Hills of Germany and carried on many explorations in the Western portion of the New World. He brought to light more than 1,000 species of extinct vertebrates, birds with teeth, flying reptiles, two new orders of mammals, the earliest monkeys and bats in the New World and series of specimens illustrating the evolution of the horse, together with the discovery of gigantic reptiles, dinosaurs, both carnivorous and herbivorous are to be numbered amongst his best known finds. He has left a monument behind him of great importance and significance. The vast amount of treasures he had gathered during the forty-five years of his active life, when properly housed and cared for and exhibited to advantage, as we trust it will be ere long, will form a magnificent series which will illustrate a most important phase of the past history of North America in an admirable manner.

The earliest paper which appeared from the pen of Prof. Marsh related to the minerals of Nova Scotia. In writing of Prof. Marsh's work, Dr. Charles E. Beecher says :

"His three mineralogical papers, published between 1861 and 1867, show the results of considerable labour and careful investigation. They treat of the gold of Nova Scotia, a Zeolite mineral from the same region and a catalogue of the Mineral Localities of the Maritime Provinces of Canada."

The following papers specially relating to Canada are here extracted from the "Bibliography" prepared by Dr. Beecher and kindly communicated to me :

1861 "*The Gold of Nova Scotia.*" Amer. Journal of Science (2) vol. 32 pp. 395-400.

1862 "*On the Sawrian Vertebræ from Nova Scotia*" Ibid. vol. 43 p. 278.

"*Description of the Remains of a New Enaliosaurian (Eosaurus Acadianus) from the Coal Formation of Nova Scotia.*" Ibid. vol. 34, pp. 1-16, pls. I.-II.

1863 "*Catalogue of Mineral Localities in New Brunswick, Nova Scotia and Newfoundland.*" Ibid. vol. 35, pp. 210-218.

1867 "*Contributions to the Mineralogy of Nova Scotia.*" Ibid. vol. 44, pp. 362-367. No. 1. *Ledererite* identical with *Gmelinite*.

Prof. Marsh was one of the leading contributors to the American Journal of Science and his writings certainly did much to add zest and interest to that publication.

His genial and courteous manner as well as characteristic good nature won for him a vast concourse of friends and admirers on both sides of the Atlantic. We shall long miss his beaming countenance and striking individuality.

The "Bibliography" of Prof. O. C. Marsh as prepared by Dr. Beecher for the American Journal of Science, 4th Series, Vol VII, pp. 420-428 is most complete and shows clearly what a master mind the subject of this brief sketch possessed. I shall close with words from Dr. Beecher's pen. (loc. cit. p. 419.)

"In closing the outline of the discoveries made by this investigator one cannot help being impressed with their signal brilliancy, their great number and especially by their unique importance in the field of organic evolution. Were all other evidence lost or wanting the law of evolution would still have a firm foundation in incontrovertible facts. The study of variation and Embryology in recent animals gives hints as to the truth, but Palæontology alone can give the facts of descent." H. M. AMI.

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No. 6.

THE BIRDS OF A GARDEN

By A. C. TYNDALL.

The garden is a tangle of evergreens, forest trees, and ornamental shrubs grown wild ; with a few sturdy perennials which grow in the sod beneath them with, apparently, the fixed determination not to be overcome by difficulties. Lest anyone take exception to the term "garden" as applied to such a wilderness, I may say here, that in the bygone time when the name was given to the half acre or so of ground it covers, the perennials were not as now the neglected children of the soil, but the pride and joy of their careful owners.

Garden or wilderness, as you will, it is a favorite place of resort and residence with the lesser fowls of the air, and while there is a bird to be found in the neighborhood it is to be found here. Here may be seen the tiny kinglet, with his voice like the note of an elfin horn ; here the scarlet tanager flashes his military looking figure across the open spaces ; and in the silence of the night it has been my privilege to hear an owl of some species unknown to me, holding forth in a manner impressively suggestive of a prediction of all kinds of woe and misfortune for the inmates of the darkness enveloped abode close by.

Chief among the birds who spend their summers in the garden, however, as a bird almost always to be found when he is looked for, is the catbird, whose longtailed, blue-drab figure is to be seen in the mulberry thickets any hour in the day. The catbird comes of good family; numbering among other connections scarcely less desirable, the famous mocking-bird as first cousin. He is a fair songster himself, but he might be better, if he would give up the mistaken idea that he is gifted in the same way as his farfamed kinsbird. The great songster of the south

might be flattered if he knew there is a bird with such an admiration for his genius as the catbird evidently has ; who indulges himself with the hope, apparently, that some day success and fame will reward his efforts also. I have known that bird to arouse himself in the middle of the night in order to render his much practised imitations of other bird's notes, just, it would appear, because it was the other bird's custom so to do—with, I fancy, much the same idea that Napoleon the Third had in believing that he was following the lead of the same destiny when he said and did the same things in ordinary everyday life as his great uncle.

Another familiar figure is that of the robin who for some years past has occupied for the season that "desirable residence" known as the big spruce in the fence corner. The American substitute for the Robin Redbreast of nursery rhyme fame, has few points in common with his English name sake, and when the New Englanders gave the big thrush the name by which he has since been known, it was not so much on account of his brick dust colored front, as that his preference for the ploughed fields and gardens of the settlements reminded them of the friendly ways of the aimiable bird they had left over the seas. They had yet to learn, that so far from having any notions of sentiment on the subject he was influenced solely by the superior advantages the newly ploughed fields and gardens afforded for his favorite diet of earth worms. Another *habitué* of the place, but who is also a resident, is Jim the crow.

Jim is a bachelor bird, the misfortune of a wing broken while he was yet a callow youth, preventing him from taking the place in life he might otherwise occupy. But even if Jim were responsible for the well being of a family, he would never I feel sure, show the lack of confidence in his friends, which the robin displays in his every movement. The latter's ideas of the dangers to which that nest is exposed are precisely the same as on that first day he deposited the beakful of mud which formed its cornerstone ; and from break of day till dark of night it does nothing but worry over anticipated difficulties, and threatened dangers. I was moved one day, by hearing shrieks of wrath which betokened a

robin in a state of mind fast approaching the hysterical, to go forth to his aid. Jim crow is not infrequently guilty of abstracting the contents of a nest when his fancy leads him to desire fresh eggs for luncheon, but Jim I could see afar off with some black-coated chums, busy catching frogs down at the meadow pond. The trouble I found to be that one of his young hopefuls had fallen from the nest. I duly replaced it, but only to find that instead of calming his fears, it made him think dangers thickened; and his frantic shrieks brought every bird in the neighborhood to see what had happened. The indigo bird who has a nest in the adjoining shrubbery, was there, looking on in silent watchfulness, the goldfinch who seems to be everywhere at once, swung himself to and fro on a bough, mocking the larger bird with gay carolings and taunting call notes until a wrathful movement on the part of the object of his attention, caused him to take a speedy departure—and the catbird, who had been hidden in the recesses of the mulberry thicket, practising a series of notes which he firmly believed would impress everybody as being an exact reproduction of the notes of the woodthrush, came out at the top, looked about him for a moment, then with a whisk of the tail which was meant to say—"That fool bird again!"—disappeared as suddenly as he had come. All this does not mean that Robin is without his good points—he is a hardworking, painstaking bird; devoted to his family, and a songster of no mean order, though as generally heard, snatching a moment's time from his pressing cares to gratify his love of the divine art,—singing a hurried matin song while four or five insatiable youngsters are demanding daily bread, in the shape of earthworms, or when at any other time of the day, he is obliged to keep a sharp look out for the enemies of him and his; while he gives his impressions of life musical utterance—it is not often he is heard at his best. Few bird songs would be more missed than his as he sits outlined against the sky on the ridge of a roof through the April evenings, and his voice is ever the first to be heard after a summer storm, in clear far sounding notes announcing that the rain is over and gone.

LIST OF FRESH-WATER FISHES OF THE GASPÉ
PENINSULA, P. Q., WITH NOTES ON THEIR DIS-
TRIBUTION IN THE MARITIME PROVINCES.

By PHILLIP COX.

1. PERCA AMERICANA, Schranck. *Yellow Perch.*

Metapedia River and Lake. Does not occur in the peninsula proper. Common in the Maritime Provinces.

2. COTTUS RICHARDSONII, Agassiz. *Miller's Thumb.*

In all the Gaspé rivers, except those emptying into Gaspé, Basin. A very variable form. Northern N. B.

3. COTTUS RICHARDSONII, Agassiz.

A peculiar variety from Bonaventure River, distinguished by its black colour, tad-pole shape, and wide separation of the dorsals.

4. URANIDEA GRACILIS, (Heckel) Putnam. *Miller's Thumb.*

Metapedia and Nouvelle, P. Q., Green River, Victoria Co., N. B.

5. URANIDEA BOLEOIDES (Girard) Jordan. *Miller's Thumb.*

Metapedia, with the last, from which it is scarcely specifically separate. Miramichi and St. John rivers, N. B.

6. CERATICHTHYS PLUMBEUS, Gunther. *C. prothemius, Cope.*

Metapedia River and Lake. A heavy stout form peculiar also to the lakes in St. John Co., N. B.

7. CERATICHTHYS PLUMBEUS, var.—

Grand Cascapedia; Nouvelle Lakes, New Carlisle; Grand Palbos. Differs from the type in the marked posterior insertion of the dorsal, short head, absence of barbel, scale formula, and crimson lateral band. An exceedingly handsome fish.

8. CERATICHTHYS PLUMBEUS, Gunther.

Little Cascapedia. Temiscouata Lake and the St John River, and Black River, Northumberland Co., N. B. The most usual type.

9. PHOXINUS NEOGÆUS, Cope. *Minnow*.

Nouvelle Lakes, near New Carlisle; its only station in the peninsula. Small lakes St. John, Kings and Sunbury counties, N. B.

10. CHROSOMUS ERYTHROGASTER, Agassiz. *Red-bellied Dace*.

Nouvelle Lakes, New Carlisle. In all respects typical except that the dorsal has uniformly *eight* rays instead of *seven*, a feature marking all our *chrosomi*. Hence there seems a good reason for dropping *erythrogaster* and adopting a new term, unless there was some mistake in Agassiz' count. Golden Grove and Clear Lakes, St. John Co., N. B.

11. CHROSOMUS ERYTHROGASTER, var.—

Harriman's Lake, Grand Cascapedia; and Goose Lake, Little Cascapedia. A small, graceful and highly coloured form, with two extra dorsal bands, lateral line entirely wanting or represented by a few pores, body very slender, head and depth less in proportion to length. Close to the last, but easily distinguished from it, especially when fresh. This form does not occur in N. B.

13. LEUCISCUS CORNUTUS, Gunther. *Shiner, Red-fin*.

Grand Cascapedia. The only station east of Metapedia. Differs slightly from the type in the Restigouche and throughout N. B., in having but *eight* rays in the anal instead of *nine*, the free margin of the dorsal straight, not concave; greater compression of head, smaller size, and larger number of scales in front of dorsal.

14. RHINICHTHYS CATARACTÆ (Val.) Jordan. *Long-nosed Dace*.

Typical, but the scale formula is 12-62-7 or 8, instead of 13-64-8. Lake Metapedia. Generally distributed in N. B.

15. RHINICHTHYS ATRONASUS (Mitch.) Ag. *Black nosed Dace*.

Cascapedia and Bonaventure rivers. Differs from the last in its broader and shorter snout, fin rays are D. 8, A. 7 as in *R. cataractæ*; undoubtedly our type of *R. atronasus*. N. B., N. S., (J. M. Jones.)

17. *FUNDULUS DIAPHANUS*, (Les.) Agassiz. *Spring Minnow*.
Bonaventure and Grand Pabos. Rustico and Hillsboro
River, P. E. I.; St. John River, and Mir, N. B.

19. *GASTEROSTEUS PUNGITIUS*, L. *Nine-spined Stick'leback*.
Cascapedia. New Brunswick and P. E. I.

20. *GASTEROSTEUS ACULEATUS*, L. *Stick'leback*.

Common on the Gaspé coast and lower courses of rivers. Like many others of our smaller species, it shows a departure from the ordinary type, for its fin formula is D. II-I, 11; A. I. 8; whereas *aculeatus* has D. II-I. 13; A. I. 9. Hence ours approaches in this respect *A. microcephalus*, but in all other features is *A. aculeatus*. The typical form, however, occurs generally in N. B. Common in N. S., (J. M. Jones.)*

21. *NOTEMIGONUS CHRYSOLEUCUS* (Mitch.) Jordan. *Golden Shiner*.
Lac à Canard and Murphy's Lake, Grand Pabos. Also occurs in Metapedia River and Lake. Alton Lake, P. E. I., the only fresh water fish Roy Vanwart found on that island.

22. *SEMOTILUS ATROMACULATUS*, Mitch. *Horned Dace*.

Cascapedia and other streams. Slightly aberrant. D. generally 8 rays instead of 7, as is the rule in N. B. Snout more pointed. Size, small. Generally distributed in N. B., Lake Metapedia fish are closer to N. B. type.

CATOSTOMUS COMMERSONII (Lac.) Jordan. *Common Sucker*.

Cascapedia and Bonaventure rivers. Metapedia. Scale formula 9-60-7 instead of 10-64-9 said to be typical of this form, though N. B. fish always show a reduction. In all other respects typical. Size large—18 inches long, generally distributed in N. B. Also in N. S., (J. M. Jones, N. S., In. of Nat., Sc. Vol. V. pt. I, 1879.)

COREGONUS LABRADORICUS RICH. ? *White-fish*.

One species occurs sparingly in the Grand Cascapedia, but I heard of it nowhere else. Could not procure a specimen, but from descriptions concluded it was this species.

*The last two species not strictly fresh-water fishes.

WINTER BIRDS OF THE OKANAGAN DISTRICT B. C.,

By Allan Brooks.

During two seasons spent hunting and collecting in the Okanagan district I was very much surprised to note the abundance of bird life in winter as compared with Central Ontario, which has a correspondingly severe winter. Not only were there a greater number of species actually wintering there, but the numerical strength of representative species was greatly in excess of such species allies in Ontario.

I might also have included in the list such species as Western Robin, and Varied Thrush as I noticed these several times at a very late date, after the snow had fallen.

I spent most of my time between Okanagan and Arrow Lakes in lat. 50° a district including every variety of country from sage brush to bunch grass and scattered pines (*Pinus ponderosa*) to the heavily timbered mountains.

The altitude of Vernon is about 1240 ft.

WINTER RESIDENTS OF THE OKANAGAN DISTRICT, B. C.;

ÆCHMOPHORUS OCCIDENTALIS. Western Grebe. A few remain all winter.

COLYMBUS HOLBOELLI. Holboells Grebe. Common.

COLYMBUS AURITUS. Horned Grebe. Common.

LARUS GLAUCESCENS. Glaucous-winged Gull.

“ *CALIFORNICUS*. California “

“ *DELAWARENSIS*. Ring-billed “

These were the only gulls identified during the winter months.

PHALACROCORAX. Sp? I noticed an immature cormorant on Okanagan Lake, January '98.

MERGANSER AMERICANUS. American Merganser. Abundant.

MERGANSER SERRATOR. Red-breasted Merganser. Rare.

LOPHODYTES CUCULLATUS. Hooded Merganser. Scarce during winter months.

ANAS BOSCHAS. Mallard. A few Mallards winter in neighborhood of Vernon; no other fluviatile ducks observed during winter months, though Widgeon and Pintail may remain.

AYTHYA VALLISNERIA. Canvas-back.

“ *AMERICANA*. Red-head.

“ *MARILA NEARCTICA* American Scaup.

“ *AFFINIS*. Lesser Scaup.

“ *COLLARIS*. Ring-necked duck.

All of the above were identified, and associate together on Okanagan Lake.

GLAUCIONETTA CLANGULA AMERICANA. American Golden-eye. Abundant.
Barrowe's Golden-eye is a common summer resident, but I never observed it during winter.

CHARITONETTA ALBEOLA. Buffle-head. Rather scarce.

OIDEMIA DEGLANDI. White-winged Scoter.

" PERSPICILLATA. Surf Scoter.

Both remain on Okanagan Lake throughout the winter.

BRANTA CANADENSIS. Canada Goose. A flock of Canada geese winters every year on Shuswap lake.

CYGNUS BUCCINATOR. Trumpeter Swan. Swans (apparently only this species) winter in suitable localities in the district.

RALLUS VIRGINIANUS. Virginia Rail. Winters.

GALLINAGO WILSONI. American Snipe. A few winter.

DENDRAGAPUS O. RICHARDSONII. Richardson's Grouse.

" FRANKLINI, Franklin's Grouse.

BONASA UMBELLUS TOGATA. Canadian Ruffed Grouse.

" " UMBELLOIDES. Gray " "

LAGOPUS LEUCURUS. White-tailed Ptarmigan.

PEDIOCÆTES PH. COLUMBIANUS. Columbia Sharp-tailed Grouse.

All the above Grouse occur in suitable localities.

CIRCUS HUDSONIUS. Marsh hawk.

BUTEO BOREALIS CALURUS. Western Redtailed Buzzard.

ARCHIBUTEO SANCTI-JOHNIS. American Rough-legged Buzzard.

The first of the above was fairly common and the other two rare during winter months.

ACCIPITER ATRICAPILLUS. American Goshawk, Goshawks, probably the typical form are occasionally seen during winter; the Western form breeds in the district.

AQUILA CH. CANADENSIS. Golden eagle. Not common.

HALLÆTUS ALBICILLA. Bald Eagle. Common.

FALCO PEREGRINUS ANATUM. Peregrine Falcon. This was the only large Falcon observed, though both Prairie and gyrfalcons winter west of the Cascades.

FALCO COLUMBARIUS. Pigeon Hawk.

" RICHARDSONII. Richardson's Merlin.

Both were seen once or twice during winter of '97-98.

FALCO SPARVERIUS DESERTICOLUS. Desert Kestrel. A few remain all winter.

ASIO WILSONIANUS. Long-eared Owl.

" BRACHYOTUS. Short-eared "

The latter much the commoner.

SCOTIAPTEX CINEREUM. Great Gray Owl. Rare.

NYCTALA RICHARDSONII. Richardson's Owl. Rare.

NYCTALA ACADICA. Saw-whet Owl. Common.

BUBO VIRGINIANUS. Great Horned Owl.

" VIRG. SUBARCTICUS. Western Horned Owl.

" " SATURATUS. Dusky " "

All three races of Great Horned Owls occur, as well as every possible intergrade between them.

NYCTEA NYCTEA. Snowy Owl.

SURNIA U. CAPAROC. American Hawk Owl. Rare.

GLAUCIDIUM GNOMA CALIFORNICUM. Pigmy Owl. Common.

CERYLE ALCYON. Belted King-fisher. Quite a number stay all winter.

CEOPHILEUS PILEATUS. Pileated Wood-pecker. Tolerably common.

DRYOBATES V. LEUCOMELAS. Northern Hairy Woodpecker.

" P. ORCÆCUS. Batchelder's Woodpecker.

Both common.

XENOPICUS ALBOLARVATUS. White Headed Woodpecker. I heard of this species but never came across it.

PICOIDES ARCTICUS. Arctic 3-toed Woodpecker. Common in suitable localities.

COLAPTES CAFER. Red-shafted Flicker. Fairly common during winter months.

OTOCORIS SP? Horned Lark. On January 10th, '98, I saw a flock of shorelarks, most probably *merrillii*, but they may have been *strigata* as both species occur and are common, the latter only on migrations, but the former breeds.

PICA HUDSONICA. American Magpie. Abundant.

CYANOCETTA S. ANNECTENS. Black Headed Jay. Common.

PERISOREUS C. CAPITALIS. Rocky Mt. Jay. Common at high elevations.

CORVUS C. PRINCIPALIS. Northern Raven. Tolerably common.

CORVUS AMERICANUS HESPERIS. California Crow. A few crows stay around the towns, but the bulk leave rather early in the fall.

PICICORVUS COLUMBIANUS. Clarke's Nutcracker. Common during winter of '97-98, but entirely absent the next winter. Many remained to breed in '98 and they also bred in '97; they lay in February.

AGELAI VS PH. SONORIENSIS. Sonoran Redwing.

SCOLECOPHAGUS CYANOCEPHALUS. Brewer's Blackbird.

A few of both the above species of Blackbirds remain throughout the winter.

STURNELLA NEGLECTA. Western Meadow Lark. A number remain about the stacks and barnyards.

COCCOTHAUSTES VESP. MONTANUS. Western Evening Grosbeak. Tolerably common.

PINICOLA E. CANADENSIS. Pine Grosbeak. Scarce during winter of '97-98, but common during '98-99. Breeds.

LOXIA C. MINOR. American Crossbill. Abundant during winter of '97-98, but apparently entirely absent the next season. I never positively identified the white-winged Crossbill, but I have no doubt it occurs as I have taken it west of the Cascades.

LEUCOSTICTE TEPHROCOTIS. Gray-crowned Leucosticte. A large flock seen once or twice in mountains to west of Okanagan Lake; these may have been *littoralis* as I have taken both species in lower Fraser River Valley.

ACANTHIS LINARIA. Redpoll. Common during both winters I spent in the district. I saw nothing of *exilis*, though I kept a good look out for it and have taken it nearer the coast.

SPINUS TRISTIS. American Goldfinch. Common during early part of winter of '97-98; never seen since. This is probably the western form.

SPINUS PINUS. Pine Finch. Abundant.

- PLECTROPHANAX NIVALIS. Snowflake. Common.
- ZONOTRICHIA INTERMEDIA. Intermediate Sparrow. Two seen 16th Dec., '98.
- SPIZELLA M. OCHRACEA. Western Tree Sparrow. A few stay all winter.
- JUNCO OREGONUS SHUFELDTII. Rocky Mountain Junco. Abundant.
- MELOSPIZA GUTTATA. Rusty Song Sparrow. Tolerably common throughout the winter.
- AMPELIS GARRULUS. Northern Waxwing. Abundant during winter of '97-98 and less so the next winter. Breeds.
- LANIUS BOREALIS. Butcher-bird. Tolerably common.
- CINCLUS MEXICANUS. Dipper. Common. Sings all winter.
- TROGLODYTES PACIFICUS. Western winter wren. Tolerably common throughout the winter.
- CISTOTHORUS P. PALUDICOLA. Tule wren. A few stay all winter.
- CERTHIA A. MONTANUS. Rocky Mountain Creeper.
- SITTA ACULEATA. Slender-billed Nuthatch.
- “ CANADENSIS. Red-breasted Nuthatch.
- “ PYGMÆA. Pygmy Nuthatch.
- All of the above common in neighborhood of Okanagan Lake, associated with Chickadees, etc.
- PARUS A. SEPTENTRIONALIS. Long-tailed Chickadee.
- “ GAMBELI. Mountain Chickadee.
- “ RUFESCENS. Chestnut backed Chickadee.
- “ HUDSONICUS COLUMBIANUS. Columbian Chickadee.
- The two former are abundant nearly everywhere, but the only place where I saw all four species associated, was the mountains to west of Arrow Lake, where by imitating the call of the Pigmy Owl, I had all four species within ten feet of me at once. Probably in no other part of America could four species of true Parus be seen together. I also took *Columbianus* on the divide between Nicola and Okanagan valleys, the most westerly point I have observed it.
- REGULUS S. OLIVACEUS. Western Kinglet. Common throughout the winter.
- MYADestes TOWNSENDI. Townsend's Solitaire. Tolerably common. Sings throughout the winter; feeds on fruit during cold weather.

SUB-EXCURSION.

The excursion to Chelsea, Sept. 9th, was one of the most enjoyable ever made under the auspices of the Club. The attendance was very large, at least one hundred Normal School students besides members of the Club and their friends being present. Addresses were delivered in the afternoon by Mr. S. B. Sinclair and Prof. John Macoun who described the plants found during the afternoon. Among the rare plants found were *Aster ptarmacoides* and *Rhyncospora capillacea*, the latter an addition to the local flora.

SOME PLANTS FROM THE NORTHWEST SHORE
OF HUDSON BAY

By M. L. FERNALD.

Shortly before his death the late Professor D. C. Eaton sent to the Gray Herbarium for determination a small parcel of plants secured for him by Mr. George Comer on the northwest shore of Hudson Bay. Mr. Comer collected these specimens during the summers of 1893 and 1894 on Depot Island (lat. $63^{\circ} 55'$ N., long. $90^{\circ} 20'$ W.) and at Whale Point (lat. about $64^{\circ} 30'$ N. long. $90^{\circ} 00'$ W.). The number of species represented is small, and most of the plants were also collected by Mr. J. W. Tyrrell* about Chesterfield Inlet, but as the collection contains some species of unusual interest it is thought well to record all the species brought back from that little known region.

ASPIDIUM FRAGRANS, Swartz. Whale Point, very abundant.

LYCOPodium SELAGO, L. Whale Point and mainland near Depot Island.

ERIOPHORUM SCHEUCHZERI, Hoppe. Whale Point. The cotton of this plant is used by the Eskimo as wicking in their stone lamps.

BETULA GLANDULOSA, Michx. Mainland near Depot Island. Used by the natives as a matting between their bedding and the snow.

SILENE ACAULIS, L. Whale Point.

STELLARIA HUMIFUSA, Rottb. Whale Point.

STELLARIA LONGIPES, Goldie, var. *EDWARDSII*, Watson. Depot Island.

SAGINA NIVALIS, Lindl. Whale Point

RANUNCULUS AFFINIS, R Br. Depot Island.

DRABA ALPINA, L. Whale Point.

*For a list of Mr. Tyrrell's plants see Ann. Rep. N. S. Geol. Surv. Can. ix (1896), part F. App. iii.

DRABA NIVALIS, Liljeblad. Whale Point and Depot Island.

EUTREMA EDWARDSII, R. Br. Depot Island.

SAXIFRAGA SILENÆFLORA, Sternb. Whale Point, July and August, 1894. Formerly known only on the Pacific coast from Vancouver to Behring Straits.

SAXIFRAGA NIVALIS, L. Depot Island.

SAXIFRAGA HIRCULUS, L. Whale Point.

SAXIFRAGA TRICUSPIDATA, Retz. Whale Point.

RUBUS CHAMÆMORUS, L. Depot Island.

DRYAS OCTOPETALA L., var. INTEGRIFOLIA C. and S. Whale Point.

PATENTILLA VAHLIANA, Lehm. Whale Point July 1894. According to Rydberg, collected by Mr. Tyrrell on Marble Island.

ONYTROPIS ARCTICA, R. Br. Depot Island, June, July, 1894. These plants are confidently identified with authentic specimens from the Benthamian herbarium of *O. arctica*. In some individuals the upper leaflets, though generally in two's are occasionally in threes' suggesting that the little-known *Spiesia Belli*, Britton, described from Digges Island and the mouth of Chesterfield Inlet, may belong here.

EMPETRUM NIGRUM, L. Depot Island,

LEDUM PALUSTRE, L. Whale Point.

CASSIOPE TETRAGONA, Don. Depot Island. Much used by the natives for fuel.

ARCTOSTAPHYLOS ALPINA, Sprengel. Whale Point.

VACCINIUM ULIGINOSUM, L., var. MICROPHYLLUM, Lange Cons. Fl. Grœnl. 91. Whale Point, July, 1894. Described by Lange from Greenland, and apparently never before collected on the American continent. Mr. Comer's plant is identical with Greenland specimens.

MERTENSIA MARITIMA, Don, Whale Point and Depot Island.

ERIGERON UNIFLORUS, L. Depot Island, Sept., 1893. Collected by Tyrrell near the forks of Telzoa River.

MATRICARIA INODORA, L., var. NANA, Hook. Whale Point, July, 1894. Collected by Tyrrell at Fort Churchill.

CHRYSANTHEMUM ARCTICUM, L. Depot Island, Sept., 1893. Previously known on Hudson Bay at York Factory (*Drummond*) and Churchill River (*Bell*).

SENECIO PALUSTRIS, Hook., var. CONGESTA, Hook. Depot Island. Formerly collected by Tyrrell at Fort Churchill.

FOUR RARE PLANTS FROM ALASKA.

By M. L. FERNALD.

Among some plants collected during July and August, 1898, on the Sushitna and Kuskawim rivers in Alaska, by Mr. Frank C. Hinckley of Bangor, Maine, were four species of great interest.

VIOLA BIFLORA, L., a common plant of northern Europe and Asia, (Japan, Kamtschatka, &c.), has been known on the American continent only from the mountains of Colorado, although it has naturally been expected to occur further north.

Mr. Hinckley found this delicate species, with clear yellow flowers, a common plant in July on the rich wooded slopes of mountains on the headwaters of the Sushitna and Kuskakwim,

PEDICULARIS HIRSUTA, L. A species well known from Arctic Europe and Asia but more rare on our own Arctic coast. Found by Mr. Hinckley on the mountain summits.

BRYANTHUS TAXIFOLIUS, Gray, was also collected on these mountain summits. This, the "Phyllodoce" is common in Arctic Europe and Asia, but in America, according to the Synoptical Flora, has been known only on the alpine summits of Maine and New Hampshire, and in Labrador.

CHRYSANTHEMUM BIPINNATUM, L., growing from Lapland through northern Asia, has been known from only two American stations, Cape Espenburg and the Yukon valley. Mr. Hinckley found it along the middle and lower valley of the Kuskakwin, thus extending its known range considerably southward.

BOOK NOTICE.

"THE BUTTERFLY BOOK": A Popular Guide to a Knowledge of the Butterflies of North America; by W. J. Holland, Ph. D., D. D., etc., New York, (also issued by Wm. Briggs, Toronto), 1898. Price \$3.

There are, I believe, few works which have appeared of late years in America which are destined to mark such an epoch in the development of American boys and girls as Dr. Holland's beautiful Butterfly Book. A most noticeable difference between the youths of Europe and America is that in the old world it is very exceptional to find any young man or woman who has not some hobby or special study to which they devote a large proportion of their spare time during the years they are at school. This extra occupation of the mind acts as a relaxation from the regular prescribed studies and has a very beneficial effect upon the development of students both mentally and physically. Some branch of natural history or athletic sports are the two directions particularly to which this energy is generally turned. Fortunately for boys and girls in Britain, France and Germany there were always well-illustrated, cheap and comprehensive works available by means of which they could identify, and learn the habits of, the insects, birds, plants and animals they wished to study. In America until quite recently there were with the exception of books on plants none of these elementary but comprehensive works and as a consequence natural history studies have been almost confined to the plant world. Recently Dr. A. S. Packard and Dr. S. H. Scudder have published delightful books on insects which have been eagerly read by our boys and girls; but Dr. Holland's Butterfly Book surpasses easily anything which has preceded it in the way of a help for those who knowing little of natural history have yet had their attention caught and wish to know about the bright coloured butterflies which are always so attractive to everyone for their beauty of form and colour as well as for their graceful movements. The delight to be derived from a study of their habits while breeding them from the egg to maturity is at everybody's disposal but has been enjoyed by very few.

The Butterfly Book at \$3 a copy is a marvel of cheapness. In 48 beautiful plates, coloured life-like photographs are given of almost every butterfly in the United States and Canada and with it a butterfly collector will hunt for many years before he finds a species which he cannot identify. Of course, even in a large 8vo of 382 pages with 48 crowded plates there are some things which might occur to one as desiderata, e.g. a few more undersides, or rather longer descriptions of the species; but let such a one think for a moment what the author has given us, and the almost nominal price at which we get it. The Butterfly Book is a magnificent work, exquisitely printed and illustrated, comprehensive and remarkably accurate. It can hardly fail to do for American boys and girls what its much humbler predecessor, Coleman's British Butterflies, has done for their thousands of brothers and sisters in Great Britain, who have to thank that little blue cloth 12mo of 175 pages with its 16 plates for many hours of fascinating study, out door exercise and innocent elevating amusement instead of much wasted time and degrading useless inactivity. J. F.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The forty-eighth meeting of this Association was held at Columbus, Ohio, on Aug. 21-26th, last.

The Canadians who attended it were Rev. Louis C. Wurtele and J. Hunter Wurtele, of Actonvale, P. Q., Mrs. A. H. Moore, of Sawyerville, P. Q., Dr. W. Saunders, (of the Experimental Farm,) A. P. Saunders, F. A. Saunders, and J. F. Whiteaves (of the Geological Survey Department), Ottawa.

At the opening general meeting, the President, Dr. Edward Orton, State Geologist, made the following graceful and kindly reference to the Canadian visitors:

No organization ever visits an American city that has a better claim on the appreciation and respect of all its people. In the first place, you can hardly expect to entertain an organization of larger range, so far at least as its name is concerned. It is the *American* Association. It transcends not only all state limits, but national boundaries as well. An organization that represents the United States takes in a respectable part of the land areas of the planet; but this

is not merely a United States organization. It especially includes that potent and ambitious neighbor of ours to the northward that owns more than 3,000,000 square miles, or a full half of the North American continent. The association always counts with all confidence on its Canadian contingent. You can hear this afternoon an address from the honored Canadian vice-president of one of our sections.

In the section of Geology and Geography, the Vice-President and Chairman, Mr. Whiteaves, gave an address "on the Devonian system in Canada," which will appear "in extenso" in the next number of *Science* and in the Transactions of the Association.

Mr. F. B. Taylor's paper on "The Galt Moraine and Associated Drainage" is an important contribution to our knowledge of the glacial geology of southern Ontario. And, in the same section (Geology and Geography), Miss Mary A. Fleming read a paper on the "Pot Holes of Foster's Flats, now called Niagara Glen," on the Canadian side of the Niagara River.

Besides a paper on "the Arboretum and Botanic Garden of the Central Experimental Farm, Ottawa," read before the Botanical Club of the Association, Dr. Saunders read two papers before the Botanical Section, one entitled "The Breeding of Apples for the Northwest Plains," and the other "Useful Trees and Shrubs for the Northwest Plains of Canada."

In the section of Physics, Mr. F. A. Saunders read a paper entitled a "Bolometrical Study of the Radiation of an Absolute Black Body."

The Botanical Section devoted one day (Wednesday, called "Sullivant Day" in the programme) to a commemoration of the scientific labours of the late William S. Sullivant and Leo Lesquereux, who lived at Columbus, two of the earliest students of and authorities on North American mosses and hepaticæ.

The members of the Geological Section united with the Geological Society of America in giving one day, (Thursday) to an examination of the glacial phenomena in the neighborhood of Lancaster.

The weather was everything that could be desired, the general attendance at the meetings fairly large, the excursions both instructive and enjoyable, and the social functions brilliant and most successful.

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No. 7.

PADDLE-NOSED STURGEON IN ONTARIO.

BY PROFESSOR EDWARD E. PRINCE, DOMINION COMMISSIONER OF FISHERIES
OTTAWA.

The late Mr. A. N. Montpetit in his work "Les Poissons d'Eau Douce du Canada," referred to a specimen of the Paddle-nosed Sturgeon (*Polyodon spathula*, Walb.) shown in the Fisheries Museum, Ottawa. "Ai-je besoin de répéter qu'il est unique au Canada," he wrote. "Faut-il vous le décrire? Couleur olive un peu pâle; opercule démesurément allongé en point, atteignant presque les ventrales ; . . . la tête, y compris la spatule et les pointes operculaires, presque plus de la moitié de la longueur du corps : la tête seule n'est égale qu' à la cinquième partie." The specimen described is indeed remarkable enough to call for special notice, for the records of the capture of *Polyodon* in Canadian waters are extremely few. I have not been able to obtain information of more than four specimens ever having been secured. About the end of May an Indian captured a fine specimen in Lake Helen, Nipigon River, Lake Superior, and on account of the uncommon interest to naturalists of such an event, I venture to offer a few remarks upon this rare and curious Canadian fish. The mounted specimen in the government collection was obtained over twenty years ago, and I have been informed by a fisherman at Sarnia that a second specimen was procured about the same time. A specimen is also recorded from Lake Erie ; but hitherto none have been secured in Lake Superior, and the example recently shipped to Ottawa is of special interest as extending the range of this rare fish westward. It was sent fresh ; but on examination its condition was such that it could not be preserved, and even the skeleton, being mainly of cartilage, is difficult to prepare as a museum ex-

hibit. This is the more to be regretted as the specimen was about five feet in length, and much larger than any known to have been before taken in the Dominion. Old fishermen near Point Edward on the Lambton county shore vaguely refer to other specimens of *Polyodon* occurring in Lake Huron; but on the other side of the watershed which bounds the southern margin of our western great lake system, that is, in the basin of the Mississippi River, and in the lakes of the central plateau of the United States, the Paddle-nosed Sturgeon is said to be common. Curiously enough it inhabits the Yang-tse-Kiang and certain Chinese waters; but elsewhere this remarkable fish is unknown. What is the meaning of this sparse distribution in such widely separated localities? Again, why is it so rare in our own lakes, and common in the great river basin to the south? The naturalist's answer is obvious. It is a fish that was once probably widespread in both the old and new worlds. It is indeed a Ganoid, a group of fishes which preceded our existing kinds, and formerly predominated on our planet. Their fossilized remains are familiar to the geologist in the Palæozoic strata. In the ancient world, especially in the Devonian Age, the Ganoid fishes abounded. At the present time the existing species are few, not more than twenty or thirty in all, as compared with 12,000 species of living Teleosteans. Their distribution is erratic and very local. Excepting the common Sturgeons (the family Acipenseridae) the surviving species of Ganoids are amongst the rarest of fishes, and *Polyodon* amongst them, is the rarest of all, and in Canada apparently almost extinct. One would expect to find in the case of any tribe of animals which are dying out, that they would survive here and there in isolated areas, and in some such localities would become more and more scarce. These features in the occurrence of an animal are the surest signs of its approaching extinction, and such signs appear in the most marked manner in the case of *Polyodon*. The exceeding rarity of specimens in our waters has called forth the suggestion that those, which are at long intervals captured in our great lakes, are not survivors or descendants of Spatularoids indigenous to Canada; but wanderers that still find means of migrating across the watershed of the Mississippi. It is more probable, however, that a few pairs still

survive, and that the young progeny find their changed environment so unfavorable that most of them perish, hence their rarity.

It is with a pathetic interest that the naturalist examines a fresh specimen of a Canadian *Polyodon*, when the rare opportunity occurs. Its uncouth and indeed grotesque form is largely due to the exaggerated length of the snout which is as long and flat as a canoe paddle. It is said to enable the fish to grub amongst sand and mud and to dislodge small crustaceans, and possibly mollusca, which are supposed to constitute its food. The organ is an enormous and cumbersome one for so simple a purpose, and it is possible that this lengthy nose or rostrum has other uses. It is, of course, a far more formidable organ than the snout of the shovel-nosed sturgeon (*Scaphirhynchus*). It recalls the powerful weapon of the Saw-fish (*Pristis*) and the Sword-fish (*Xiphias*), and differs most markedly from all its Ganoid congeners in its general external form. Of course the Sword-fish is a shark, and the Saw-fish is a Teleostean allied to the Mackerels (*Scomberidæ*), both equally distantly separated from *Polyodon*, yet there is a striking resemblance in the flat, elongated, blade-like snout of all three. The anatomist finds, however, that these externally similar structures are very differently formed, and bear no resemblance to each other when their osteology is examined. Thus in *Pristis* the mesethmoid rod which, in such a fish as the haddock, projects from the frontal bone, covering the fore part of the head, is prolonged and flattened, and provided along its lateral edges with twenty or thirty strong teeth. On the other hand, in *Xiphias*, the Sword-fish, the double vomer, which underlies the mesethmoid and roofs over the mouth anteriorly, grows forward, along with the two premaxillary or upper-jaw bones, and the three form the toothed flat beak which is often thirty inches in length. It is the palato-quadrates cartilages in *Polyodon* which are lengthened and shielded by bony maxillary plates which form the long spatulate beak in front of the head in this species. I was struck by the massive rotundity and vertical depth of the body in the Paddle-nosed Sturgeon under consideration. The protruding beak occupied fully one-third of the total length of the fish. Its eyes, small, dull, and in life no doubt expressionless like those of the common Sturgeon, were low down and

close to the root of the paddle-snout. They were placed as in some of the whales just above the angle of the mouth. The mouth was of enormous capacity, toothless and quite underneath the head, far back as in all sturgeons. The gape was enormous so that the lower jaw formed a huge tongue-shaped flap, pointed in front and capable of being very widely opened. Next to the absurd elongated snout and the great capacity of the mouth, the most noticeable feature was the remarkable leathery operculum. In the Sturgeon it is small and insufficient to cover the red gills, but in *Polyodon* it sends back a pointed flap long enough to reach nearly half the length of the body. From this upper flap the hind margin of the operculum gracefully curved down and forward and the flap on each side met below and formed a prominent projecting collar in the jugal or throat region. The skin was, soft slimy and naked, in contrast to the enamelled scales and bony plates which cover the skin in other Ganoid fishes. It resembled the smooth integument of the porpoise : but was of a dark bluish purple colour, varied by pale blue wavy lines passing diagonally and slightly opalescent. The opercular flap is traversed by radiating sinuous mucus canals. The paired fins, pectoral and ventral, occupy the characteristic Ganoid position quite underneath the body. They are powerful, and possess a stout and prominent basal part or peduncle. The great dorsal fin and the equally large anal fin resemble the same members in the Sturgeon : but the basal portion is far more massive and the margin more deeply lunate. The tail is an enormous organ, very deeply forked and the upper lobe is extremely high, and the back bone extends to the tip, a perfect heterocercal caudal fin. All the fins are dusky and leathery like those of a shark.

An anatomical examination would have revealed many interesting features : but it was not possible. It would, for example, have shown the absence of ribs, the persistence of the gristly rod or notochord, whose sheath never becomes segmented. There is, in *Polyodon*, no true backbone. The operculum develops a bony basal part : but it is attached to the suspensorium of the jaws, which is cartilaginous, except at the upper part articulating with the periotic surface of the skull. It is interesting to find that the spiracles which, with one exception, are found on the top of

the head in Ganoids, between the eyes and the gills, possess a few gill-filaments, and have not lost their branchial function. There is no accessory or opercular gill, such as we find in the Sturgeon and *Lepidosteus* on the posterior face of the hyoid arch; but a pseudobranchia distinct from a true opercular gill occurs. In spite of its name *Polyodon* has no teeth. They are present in the young: but disappear as the fish grows. It is said to frequent only the dark and deeper parts of the rivers and lakes where it occurs, and both on account of its structure and habits is a singular type amongst fishes. It has, as already pointed out, many exceptional features distinguishing it from its Ganoid allies, and would never be ranked by an ordinary observer with the Sturgeon, the Bow-fin (*Amia*) or the Bony Pike or Bill-fish (*Lepidosteus*) of our own waters or with the *Polypterus* of the Nile and Senegal, or with the African *Calamoichthys*, from Calabar. To the scientific eye they all belong to one group, one of the most interesting groups in the whole range of Zoology. The Ganoids on the one hand possess features of the Shark tribe (e.g. the many-valved conus arteriosus, the heterocercal tail, and the intestinal valve), while they exhibit features which are equally typical of the Teleosts or Bony Fishes, viz.: free pectinate gills, an operculum, a permanent mesonephros, and the production of small spherical eggs in considerable quantity. They are a generalised type of fishes, and of great antiquity, as geological evidence demonstrates. Hence their morphological and palæontological importance.

SALSOLA KALI TRAGUS.

A few specimens of "Russian Thistle" were found this summer by Mr. W. T. Macoun, the Horticulturist at the Experimental Farm, in a field of Alfalfa sown last year. The Alfalfa seed was purchased in Ottawa, but though the "thistle" has ripened its seed there is no danger of its spreading or becoming the noxious weed it is in the west. It is only on the prairies that it is to be feared.

CONTRIBUTIONS TO CANADIAN BOTANY.

By JAMES M. MACOUN, ASSIST. NATURALIST, GEOL. SURVEY
OF CANADA.

XIII.

ANEMONE RIPARIA, Fernald, Rhodora, vol. 1, p. 51.

This species recently described by Mr. Fernald is represented in our herbarium by a single specimen collected in 1882 at Madeleine River, Gaspé, Que., and in 1899 at Woodstock, N.B., by Prof. John Macoun. Mr. Fernald gives as additional Canadian stations Restigouche Co., N.B. (*Fowler*), and Roberval, Lake St. John, Que.

RANUNCULUS ABORTIVUS, L. var. EUCYCLUS, Fernald, Rhodora, vol. 1, p. 52.

Stems more slender than in the type; the branches slender and flexuous; leaves very thin and lucid; the basal generally of two sorts, some orbicular with a narrow or closed sinus, others reniform as in typical *R. abortivus*; flowers, achenes and receptacles as in the species but smaller.

Mr. Fernald records this plant from Lake St. John and Tadousac, Que., but it is not represented among our herbarium specimens of *R. abortivus*. It should be looked for by Canadian collectors.

ISOPYRUM BITERNATUM, T. & G.

Though collected before in S. W. Ontario any records of this species are of interest to botanists. Mr. Leroy J. Boughner writes of specimens sent to the Geological Survey department: "This little plant was first collected by me during an expedition of the Simcoe High School Scientific Society on May 21st, 1897. It grew sparsely in a cool spot near Lynn Valley, a few miles east of Simcoe. It is supposed to have been introduced from Ohio by railways."

HESPERIS MATRONALIS, L.

A garden escape near Victoria, Vancouver Island. (*A. J. Pineo.*) Not recorded west of Ontario *

*The Geological limits given in these contributions refer to Canada only.

LESQUERELLA OCCIDENTALIS, Wat.

Dry slopes Osoyoos Valley, B.C., 1898. (*C. de B. Green.*)
New to Canada.

VIOLA SUBCORDATA, Greene, Pittonia, vol. 111, page 316.

Open or partly open land, Esquimaux, Vancouver Island, 6th June, 1896. Herb. No. 18,708. (*J. R. Anderson.*) A beautiful species nearly related to *V. Howellii*. Known only from the above locality.

VIOLA SUBVESTITA, Greene.

On the cliff below Governor's Bay, Ottawa, Ont., 1899. (*J. M. Macoun.*)

VIOLA SAGITTATA, Ait.

We have no true *V. sagittata* in Canada, at least none of the specimens in our herbarium are referable to that species. All specimens so named are either *V. ovata*, Nutt, or *V. dentata*, Pursh. which may, however, yet prove to be one species.

V. OVATA, Nutt.

V. sagittata, Macoun, Cat. Can. Plants, vol. 1, p. 63 in part.

Our herbarium specimens are from dry fields east of Belleville, Ont. (*John Macoun.*) Near Hamilton, Ont. (*J. M. Dickson.*) Strathroy and woods about London, Ont. (*J. Dearness.*)

V. DENTATA, Pursh.

V. sagittata, Macoun, Cat. Can. Plants, vol. 1, p. 63, in part and vol. 1, p. 492.

Prince Edward Island. (*L. W. Watson.*) Point Pleasant, N. S. (*John Macoun.*) London, Ont. (*Dr. Millman.*) Komoka, Ont. and London, Ont. (*J. Dearness.*) Port Flamboro, Ont. (*J. M. Dickson.*) Though kept separate here it is more than probable that *V. ovata* and *V. dentata* are forms of the same species.

VIOLA SEPTENTRIONALIS, Greene, Pittonia, vol. 111, p. 334, and Ott. Nat., vol. x11, p. 183.

Billings' Bush, S. E. of Billings' Bridge, Ottawa, Ont., 1898. Type locality. Herb. No. 18,561. (*J. M. Macoun.*) St. Catherines, Ont. (*W. C. McCalla.*)

VIOLA MACOUNII, Greene, Pittonia, vol. III, p. 335 and Ott. Nat. vol. XII, p. 184.

On dry limestone shingle, growing among grass in the shade of cedars, between Rockliffe Road and Governor's Bay, Ottawa, Ont. Type locality. Herb. No. 18,746. (*J. M. Macoun.*) The specimens collected by Prof. Macoun, near Hull, and referred to this species in Ottawa Naturalist, represent a new species not yet described.

VIOLA VENUSTULA, Greene, Pittonia, vol. III, p. 335, and Ott. Nat. vol. XII, p. 184.

In the wet meadows between the Rockliffe Road and Governor's Bay, Ottawa, Ont. Type locality. Herb. No. 18,565. (*J. M. Macoun.*)

VIOLA CUCULLATA, Ait.

A common violet throughout Eastern Canada. The only species of this group of general distribution.

VIOLA DICKSONII, Greene, Pittonia, vol IV, p. 65.

V. cuspidata, Ottawa Naturalist, vol. XII, p. 185.

Allied to *V. cuspidata*, but the herbage light-green, the pubescence more sparse and hispidulous, the petaliferous flowers on nearly terete peduncles about equalling the leaves and bibracteolate near the base; sepals lanceolate, either naked or ciliolate; corolla about $\frac{3}{4}$ inch long, of a fine lavender-blue, the paired petals, especially the two uppermost, obovate-rhomboidal, the laterals white at base and strongly bearded with indistinctly clavellate hairs, the keel-petal shorter and narrower than the others, more or less conduplicate or convolute especially at the apex, white at base and purple-veined above the white; summer foliage less broad in proportion to its length than in *V. cuspidata* and more apt to be cucullate; apetalous flowers on short but nearly or altogether hypogeous peduncles.

A very common violet in the vicinity of Ottawa and probably abundant throughout Ontario, Mr. J. M. Dickson having collected it at Hamilton and Mr. Wm. Scott at Niagara-on-the-Lake, Queenston, Cartwright and Toronto. Dr. Greene in Pittonia, vol. IV, p.

66, has explained fully the unfortunate circumstances which resulted in the publication of this plant as *V. cuspidata* in my "Notes on Some Ottawa Violets," in the Ottawa Naturalist for January, 1899. I at that time hesitated to publish even six new violets from the *cucullata* aggregate, and though aware that Dr. Greene's description of *V. cuspidata* did not answer well for our plant it seemed preferable to include it in that species rather than describe another species. Ample material collected this year shows that we have in the vicinity of Ottawa at least four additional species of violets in this group, two of which have recently been described by Dr. Greene and are included in this paper.

VIOLA POPULIFOLIA. Greene, Pittonia, vol. III, p. 337, and Ott. Nat., vol. XII, p. 186.

Port Flamboro, Ont. (*J. M. Dickson*).

VIOLA ELEGANTULA; Greene, Pittonia, vol. IV, p. 66.

Acaulescent and low, the whole plant at the time of petaliferous flowering barely three inches high and the peduncles far exceeding the leaves; rounded and cordate-reniform leaves pale green and slightly succulent, about $\frac{3}{4}$ inch wide, short-petioled and the petioles erect, the margin lightly crenate and all parts wholly glabrous: peduncles obscurely angled, bibracteolate above the middle, the bractlets subulate: sepals lance-linear, obtusish: corolla rather more than half an inch in length, not as broad as long; petals all similar in size and outline, oblong-obovate, obtuse or retuse, light-blue, the lower three with conspicuous violet veins on a white ground at base, the laterals bearing a low and thin tuft of short strongly clavate hairs, or some of them shortened to mere papillæ; two upper petals naked, in full expansion deflected and concealing the calyx: style elongated: late apetalous flowers small, aerial on short horizontal or recurved peduncles.

In depressions in sandy fields at Eastman's Springs, Ont., and east of Beaver Meadow Lake, near Hull, Que., 1899. (*J. M. Macoun*.)

VIOLA VAGULA, Greene, Pittonia, vol. iv, p. 67.

Larger than the last, with dark green glabrous rather notably fleshy herbage : leaves at time of petaliferous flowering, about an inch in diameter, somewhat deltoid-cordate, the length equalling or surpassing the breadth, the margin lightly crenate: peduncles surpassing the leaves, obscurely angled or semiterete, bibracteolate in about the middle, the rather obtuse bractlets with a few obscure glandular teeth : sepals oblong, obtuse : corolla nearly an inch in diameter, the breadth commonly greater than the length ; petals deep violet, at base darkly venulose on a white ground, all obovate-spatulate, obtuse or notched, the odd one especially broad and often obcordate, the pair next to it bearing each a dense tuft of rather long and slender not in the least clavellate hairs ; style not prolonged beyond the anthers : apetalous summer flowers aerial, but their peduncles short and more or less horizontal ; their capsules short and thick, not dotted.

Throughout the whole extent of the Beaver Meadow, W. of Hull, Que., 1899. (*J. M. Macoun.*) A very beautiful species intermediate between *V. cucullata* and *V. venustula*.

SUBULARIA AQUATICA, L.

In fresh water ponds, Attu Island, Aleutian Islands, Behring Sea, Aug. 29th, 1891. (*J. M. Macoun.*) Not before collected in that region.

STELLARIA AQUATICA, Scopoli.

Common at Chelsea, Que.

SPHÆRALCEA MUNROANA, Spach.

Dry clay "benches," Osoyoos Valley, B.C., 1898. (*C. de B. Green.*) New to Canada.

ACER RUBRUM, L.

Little Turtle River, Rainy Lake, Ont., long. 93° W. (*W. McInnis.*) The western limit for this species.

TRIFOLIUM INCARNATUM, L.

Cultivated for fodder and now becoming extensively naturalized in Ontario.

ARACALLUS CAMPESTRIS (DC.) var. JOHANNENSIS, Fernald, Rhodora, vol. 1, p. 88.

The Canadian stations given for this plant by Mr. Fernald are Isle d'Orleans below Quebec. (*Mrs. Shepard, Prof. Brunet.*) Mouth of Madawaska River, N.B. (*G. U. Hay, G. F. Matthew.*) Crevices of ledges, Aroostook Falls, N.B. (*M. L. Fernald.*) Rocky banks, Hero's Rapids, Restigouche River, N.B. (*G. U. Hay.*) Our only herbarium specimens were collected at Aroostook Falls, N.B., by Mr. G. U. Hay, in 1883 and at Woodstock N.B. by Prof. Macoun in 1899.

ARAGALLUS CAUDATUS, Greene, Pittonia, vol, iv, p. 69.

Moose Jaw, Assa., June 26th, 1896, Herb. No. 13,957.* (*John Macoun.*) A very beautiful and distinct species, not at all resembling the common *A. Richardsonii* of the prairies.

ARAGALLUS FOLIOLOSUS, Hook. Fl. Bor. Am., vol. 1., p. 146.
O. foliolosa, T. & G. Fl., p. 339.

In describing *O. foliolosa*, Hooker says: "*Capitula late ovata seu subglobosa, ratione plantæ parva, floribus compactis, patentibus, inferioribus reflexis.*" How an acaulescent plant with compact heads—heads "far more compact" than *O. cærulea*—should ever have been referred to *O. deflexa* will probably never be fully explained; that it has no very close affinity with that species is evident. The error doubtless originated in confusing *O. foliolosa* with an apparently acaulescent form of *O. deflexa*, (Proc. Am. Ac. Arts & Sc., vol. xx, p. 4) the "*forma subacaulis*" to which Gray referred *O. foliolosa*. It is indeed probable that in describing *O. foliolosa*, Hooker had before him the flowers of that species and fruiting specimens of the sub-accaulescent form of *O. deflexa* which is not uncommon in the region traversed by Richardson and Drummond. Our specimens agree in every particular with his description of *O. foliolosa* until the fruit is reached, the "rather remote, deflexed" legumes, "an inch long" are those of *O. deflexa*, while "compact broadly ovate heads" could not refer to

* These numbers refer to the herbarium of the Geological Survey of Canada.

that species. These fruiting specimens of *O. deflexa* were also probably included in giving the range of *O. foliolosa*.

O. foliolosa is from 4 to 7 inches high, occasionally somewhat decumbent; legumes 3-5 lines long, clothed with black hairs, pendent, but when as in flower forming a compact head; otherwise as described by Hooker. From its habit and range it is evidently a high alpine and northern species.

Our herbarium specimens are from Northern Labrador, Herb. No. 18,668. (*A. P. Low.*) Rocky Mountains. (*John Macoun.*) Arctic North America (*Dr. Richardson.*)

These latter are young flowering specimens and were distributed from the British Museum as *O. foliolosa*.

CASSIA MARILANDICA, L.

Two or three plants near the Thames River, east of Thamesville, Ont., 1892; on flats of Cornwall's Creek, Howard Township, Kent Co.; Aug. 15th, 1892, well established; around the mouth of a government ditch, Tilbury, Ont., 1894. (*J. Dearness.*) New to Canada and perhaps indigenous in S. W. Ontario.

LATHYRUS MARITIMUS, Bigel. var. ALEUTICUS, Greene.

A not rare variety on the Labrador coast and on both sides of Hudson Bay. Described from Alaska where, as on Hudson Bay, it is not mixed with, but in many localities takes the place of *L. maritimus*. The smaller size of the variety is not in my opinion due to habitat as *L. maritimus* of large size is found in equally exposed situations in the same latitudes.

DRYAS INTEGRIFOLIA, Vahl.

Summit of Moose Mt., Elbow River, Rocky Mts. Alt. 7,500 ft. Herb. No. 20,001. (*John Macoun.*) Southern limit in Rocky Mountains.

ALCHEMILLA VULGARIS, L.

Metis, Que., 1897. (*Mrs. Brodie.*) Not recorded west of Nova Scotia.

ROSA PRATINCOLA, Greene, Pittonia, vol. IV, p. 13.

One of the commonest, if not the most common, roses on the Canadian prairies, extending from Manitoba west to the Rocky

Mountains and north to the Saskatchewan. There is no *R. Arkansasana* in Canada.

ROSA MACOUNII, Greene, *Pittonia*, vol. iv, p. 10.

R. Woodsii. Macoun, *Cat. Can. Plants*, vol. 1, p. 521 in part.

Moosejaw, Assa. Herb. No. 12,615, in flower June 17th, 1896; fruit, Herb. No. 10,532, Aug. 13th, 1895; White Mud River, Cypress Hills, Assa., Herb. No. 10,535; Cypress Lake, Assa., Herb. No. 10,534; Spur Creek, Milk River, Assa., Herb. No. 10,533; Canmore, Kananaskis and Banff, Rocky Mountains. (*John Macoun*.) Maligne River, Athabasca River, Alberta, Herb. No. 19,451. (*IV. Spreadborough*.) Specimens from nearly all the above localities were named *R. Woodsii* by Crepin, but we have no *R. Woodsii* in Canada.

TOLMIEA MENZIESII, T. & G.

Dawson Harbor. Queen Charlotte Islands, B. C. (*Dr. C. F. Newcombe*.) Cowichan Lake, Vancouver Island. (*J. R. Anderson*.) Not before recorded from Vancouver Island.

HEUCHERA CYLINDRICA, Dougl.

Dawson Harbor, Queen Charlotte Islands, B. C. (*Dr. C. F. Newcombe*.) A new station.

HEUCHERA PARVIFOLIA, Nutt.

Open prairies, Crow's Nest Pass, Rocky Mts. Herb. No. 20,167. (*John Macoun*.) Western limit.

RIBES LEUCODERME, Heller, *Bull. Torr. Bot. Club*, vol. xxiv, p. 93.

Nearly all our specimens from Southern Alberta referred to *R. oxycanthoides* are this species.

DROSERA LONGIFOLIA, L.

D. Anglica, Huds.; Macoun, *Cat. Can. Plants*, vol. 1, pp. 165 & 529.

D. intermedia, var. *Americana*, Macoun, *Cat. Can. Plants*, vol. 1, pp. 166 & 529 in part; *Contr. to Can. Bot. Pt. x*, p. 273.

Throughout subarctic Canada. Our specimens are from east branch of Hamilton River, Labrador. Herb. No. 4998. (*A. P.*

Low,) Salt Lake, Anticosti, Que.; Lake Huron, Ont.; Porcupine Mts., Man.; Prince Albert, Sask.; Revelstoke, B. C.; Beaver Creek, Selkirk Mts., B. C.; Horne Lake, Vancouver Island. (*John Macoun*.) Tete Jaune C che, headwaters of Fraser River, B. C. (*W. Spreadborough*.)

MEGARRHIZA OREGANA, Torr.

Union Bay, Saanich, Vancouver Island, 14th July 1898. (*J. R. Anderson*.) New to Canada.

GALIUM MOLLUGO, L.

St. James' Cemetery, Toronto, Ont., 1897. (*W. Scott*.) Only Ontario station.

APLOPPAPPUS LYALLII, Gray.

Mt. Cheam, Lower Fraser, B. C., 1898. (*J. R. Anderson*.) Western limit.

SOLIDAGO PURSHII, Porter.

S. humilis, Macoun; Cat. Can. Plants, vol. 1, p. 213 in part.

Our only specimens of this species were collected in 1883, at South West Point, Anticosti, Que., by Prof. Macoun. All the other references under *S. humilis* in the Catalogue of Canadian Plants should probably go to *S. decumbens*, Greene.

ASTER ENGELMANNI, Gray.

Brazeau River, North Saskatchewan River, lat. 52° 40', 1898. (*W. Spreadborough*.) Northern limit.

ARNICA PARRYI, Gray.

Headwaters of Fraser River, Yellowhead Pass, Rocky Mountains, 1898. (*W. Spreadborough*.) Northern limit.

ARNICA TOMENTOSA.

Stems clustered, three inches to a span high, simple and generally monocephalus, radical leaves oblanceolate or spatulate, conspicuously 3-nerved, loosely villous or sometimes tomentose; cauline, lanceolate or linear-lanceolate, villous-tomentose: involucre

and peduncle woolly-tomentose ; rays, numerous, short : achenes hirsutulous ; pappus soft, white, barbellate.

Not rare on the eastern slopes of the Rocky Mountains, at high altitudes, between the International Boundary and Lat. 54°. Distributed from the Herbarium of the Geological Survey of Canada, under numbers 11,606, 14,708 and 19,635.

SENECIO ROBINSII, Oakes.

S. aureus. *L. var. lanceolatus*, Oakes ; Macoun, Cat. Can. Plants, vol. 1, p. 265.

A well defined species, easily separable from *S. aureus* and all its varieties. Rare on Cape Breton Island, N. S. The only specimens found by Prof. Macoun in 1898, were at Big Intervale, Margaree, and in woods at Baddeck.

VACCINIUM PENNSYLVANICUM, Lam. var. ANGUSTIFOLIUM, Gray.

Macoun, Cat. Can. Plants, vol. 1, p. 290.

Union Road, Prince Edward Island ; in bogs, Louisburg, Cape Breton Island. (*John Macoun*.) Recent explorations have shown this plant to be widely distributed in Labrador.

PTEROSPORA ANDROMEDA, Nutt.

A new locality for this widely distributed but seldom collected plant is Tête Jaune Cache, headwaters of Fraser River, Rocky Mountains. (*W. Spreadborough*.)

BARTONIA IODANDRA, Robinson.

Holyrood, Newfoundland. (*Robinson & Schrenk*.) Grand Lake, Newfoundland. (*A. Waghorne*.) These records in Botanical Gazette, vol. xxvi, p. 47. In a bog six miles from Half Way House, Cape Breton Island, N. S., Aug. 5th, 1898. Herb. No. 19,857. (*John Macoun*.)

VERBENA STRICTA, Vent.

Along the Grand Trunk Railway embankment at Stamford, Ont., 1898. (*R. Cameron*.) St. David's, Ont., 1898. (*W. Scott*.) New to Canada.

VERBASCUM BLATTARIA, L.

Roadsides, Mira Bay, Cape Breton Island, N. S. (*John Macoun.*) Not recorded east of Ontario. These specimens are the subspecies *V. virgatum*, with very glandular shortly decurrent upper leaves, and pedicels shorter than the calyx.

PEDICULARIS CAPITATA, Adams.

Moose Mountain, Elbow River, Rocky Mountains, alt. 7,000 ft., 1897. Herb. No. 19,916. (*John Macoun.*) Mountains near Lac Brulé, Athabasca River, Alta. Herb. No. 19,917, 1898. (*W. Spreadborough.*) Not before recorded from Rocky Mountains, or south of the Arctic Circle in Canada.

PLANTAGO ERIPODA, Torr. var. CYLINDRICA,

Maligne River, Athabasca River, Alberta, July 6th, 1898. Herb. No. 20,073. (*W. Spreadborough.*) A span high, leaves and scape pubescent, spike $\frac{3}{4}$ -1 $\frac{1}{4}$ inch long, cylindrical. This is probably *P. lanceolata*, var. *B.*, Hook, Fl., vol. ii, p. 123, and very likely a good species.

MYRICA CAROLINENSIS, Mill,

M. cerifera, Macoun, Cat. Can. Plants, vol. 1, p. 435.

Common on Prince Edward Island, Cape Breton Island and in parts of Nova Scotia and New Brunswick. *M. cerifera* is not found north of Maryland, U. S.

LARIX LYALLI, Parlatt.

Between Kootanie Lake and the St. Mary's River watershed, B. C., at altitudes between 6,500 to 7,000 feet, or a little more, 1898. (*Samuel S. Fowler.*) Western limit.

LILIUM COLUMBIANUM, Hanson.

Tete Jaune Cêche, headwaters of Fraser River, Rocky Mountains, 1898. (*W. Spreadborough.*) Northern and eastern limit.

LYSICHITON KAMTSCHATCENSE, Schott.

Wet woods near Canoe River, western slope of Rocky Mountains in Lat. 53°. 1889. (*W. Spreadborough.*) Eastern and, in that part of Canada, northern limit.

SCRIPUS RUFUS, (Huds.) Schrad.

Marshes on summit of Smoky Mountain, Cape Breton Island, N. S., 1898. (*John Macoun.*) Not before recorded from Nova Scotia.

SCIRPUS SUBTERMINALIS, Torr.

In Fresh-water Pond, North Ingonish, and summit of Smoky Mountain, Cape Breton Island, N. S., 1898. (*John Macoun.*) Not recorded from Nova Scotia.

CAREX COSTELLATA, Britt.

Edge of willow thickets near St. Catherines, Ont., 1898. (*W. C. McCalla.*) The only Canadian specimens we have seen.

CAREX CRAWEI, Dewey.

Damp meadows, Baddeck, (Herb. No. 20,810), and Smoky Mountain, (Herb. No. 20,811), Cape Creton Island, N. S., 1898. (*John Macoun.*) Not before recorded from Nova Scotia.

ERAGROSTIS CAPILLARIS, Nees.

A weed in a peach orchard, near St. Catherines, Ont., 1898. (*W. C. McCalla.*) New to Canada.

GLYCERIA VILLOIDEA, Fries.

Near Prince George's Sound, Hudson Strait, 1897. (*Dr. R. Bell.*) Very abundant on saline mud, St. Paul Island, Behring Sea. (*J. M. Macoun.*) Not before recorded except from Greenland.

ASPIDIUM OREOPTERIS, Swartz.

Shawnigan Lake, Vancouver Island, August, 1897. (*J. R. Anderson.*) One of our rarest ferns and not before collected on Vancouver Island.

ASPIDIUM ACULEATUM Swartz. Var. SCOPULINUM, D. C. Eaton.

Amongst rocks near the sea, Texada Island, Gulf of Georgia, B. C., Aug. 1897. (*J. R. Anderson.*) Not before found in Canada west of Province of Quebec, but collected in Washington, U. S.

WOODWARDIA RADICANS, Smith. Var. AMERICANUM, Hook.

Rich soil amongst hummocks, Texada Island, Gulf of Georgia, Aug. B. C. 1897. (*J. R. Anderson.*) New to Canada.

NOTES ON A STROMATOPOROID FROM THE HUDSON
RIVER FORMATION OF ONTARIO.

BY LAWRENCE M. LAMBE, F. G. S.

• LABECHIA HURONENSIS, Billings, sp.

Stenopora Huronensis, Billings, 1865. Pal. Fossils, vol. 1, p. 185.*Tetradium Huronense*, Foord (in parte). 1883. Contr. to Can.
Cambro-Sil, micro-pal., p. 25, pl. vii, figs. 1, 1a.*Labechia ohioensis*, Nicholson, 1885, Mon. Brit. Strom. p. 32,
footnote and pl. II, figs. 1 and 2.*Labechia montifera*, Ulrich. 1886. Contr. to Am. Pal., vol. 1,
p. 33, pl. II, figs. 9, 9a.*Labechia ohioensis*, Nicholson, 1886. Ann. and Mag. Nat. Hist.
p. 13.

There are in the Museum of the Geological Survey a number of specimens of a *Labechia*, from Cape Smyth, Lake Huron, collected by Doctor R. Bell in 1859. These specimens were described by Mr. Billings in 1865 in the Palæozoic Fossils, vol. 1, under the name *Stenopora Huronensis*.

In one of his papers in the "Contributions to Canadian Cambro-Silurian Micro-palæontology," Mr. A. H. Foord states that having made a microscopical examination of *Stenopora Huronensis*, Bill., he finds that it belongs to the genus *Tetradium*. Mr. Foord gives an amended description of this species as he understands it, but unfortunately includes in it two distinct forms, under the name *Tetradium Huronense*. The specimens represented on plate VII, fig. 1, of Foord's paper consists of a *Labechia*, the minute structure of which is well preserved, incrusting a small mass of *Tetradium fibratum*, Safford. The original of figure 1a is a small portion only of a large mass of the *Labechia* measuring nearly $5\frac{1}{2}$ inches across. These specimens figured by Foord were those used by Billings in describing *Stenopora Huronensis* and are still in the museum of the Survey. The structure is clearly shown on polished surfaces in both specimens proving beyond doubt that

the fossils belong to the genus *Labechia*, incrusting, in the first instance, and massive in the second.

Dr. Nicholson's description of *Labechia ohioensis* is based upon specimens obtained by him at Waynesville, Ohio, and the Cape Smyth specimens of *Stenopora Huronensis*, Bill., collected by Dr. R. Bell* in 1859. Dr. Nicholson states that in the Cape Smyth specimens the structure is much better preserved than in those from Ohio. He also mentions (p. 14, Ann. and Mag. Nat. Hist.) that Mr. Foord had drawn his attention to the fact that "some of the appearances which he describes as characterizing *Tetradium huronense*, Bill., sp. are really due to the fact that the specimens of this coral which he examined were covered with a crust of *Labechia ohioensis*."

The same specimens are thus seen to have been used for the description of *Stenopora Huronensis*, Bill., *Tetradium Huronense*, Foord, and *Labechia ohioensis*, Nich., with, in the case of *ohioensis* the addition of the Waynesville specimens, so that these names are synonymous.

The writer is of the opinion with Dr. Nicholson, that Professor Ulrich's *L. montifera* (op. cit.) is specifically the same as *L. ohioensis* judging from the figure preceding the description of the former and from the two figures of its structure which are stated to have been made from microscopical drawings of a specimen from Waynesville, Ohio.

It would seem therefore that Nicholson's and Ulrich's species are identical with Billings's species. As the fossils described by Billings are not referable to the genus *Stenopora*, Lonsdale, but to *Labechia*, Milne-Edwards and Haime, they should be known by the name *Labechia Huronensis*, Bill.

* In Dr. Nicholson's description of *L. ohioensis*, (Ann. and Mag. Nat. Hist. p. 145.) Mr. A. H. Foord is incorrectly stated to have been the collector of the Cape Smyth specimens.

ENTOMOLOGY.

WORM-SNAKES AND SNAKE-WORMS.

Upon rare occasions and at long intervals, the field-naturalist in his rambles comes across a strange grayish old-rope-like object lying on the ground but moving forward very slowly and bearing a remarkable resemblance to some strange kind of snake. These are known as "worm-snakes" and are made up of myriads of the grayish or leaden-coloured larvæ called "snake-worms" which are the maggots of certain gnats belonging to the genus *Sciara*. These gnats are superficially somewhat like mosquitoes but have much more conspicuous antennæ, and have also the important difference of habit that they do not bite. The maggots of several kinds of these gnats have gregarious habits and some may be found in dense masses under the bark of trees. When full-grown the snake-worms are about $\frac{3}{8}$ of an inch long and a little thicker than an ordinary pin, of a dirty white colour, tapering slightly to each end and with a tiny black shining head. When about to change to the pupa state, they congregate in vast numbers, form processions and migrate, sometimes long distances, in search of a suitable place to complete their transformations.

The following interesting account of one of these curious migrations is written by our correspondent, Mr. T. N. Willing, of Sylvan Glade, Olds, Alberta: "While at Prince Albert on the 20th of July last, my attention was called to a very strange sight. At first glance it appeared like a snake about five feet long, which tapered from the head to the tail and moved slowly along the ground. Upon closer examination this rope-like object proved to be composed of a vast number of whitish larvæ, of which I am sending you some samples in alcohol. These larvæ had moved in a body about 30 feet from where their trail was first seen, issuing from underneath a wood pile. They all kept together in the form of a snake, the head being about half an inch thick, one and a half inches wide, and two inches long. From this head the body tapered from one inch wide down to a single larva. Upon drawing a stick across the body of this snake of worms, so as to scatter them, they immediately closed up again and completed the continuity of the mass. I enquired the next day what had become of

this curious object and was told that the larvæ had been killed by covering them with salt."

There are accounts of these curious aggregations of larvæ in many American and European publications (*e. g. Insect Life*, iv, p. 215). In Europe, worm-snakes have been recorded which were 4 or 5 inches wide and from 10 to 12 feet long. Most of the American accounts (which may perhaps seem strange to some!) describe as a rule worm-snakes much more moderate in proportions, viz. from 3 to 6 feet in length by from 1 to 3 inches wide. Upon one occasion only have I seen one of these worm-snakes. This was some miles from Nepigon, north of Lake Superior, in the month of August. The snake was about 4 feet long, about an inch wide and with a large expansion about one third of the length from the head. I had no convenience at the time to preserve the larvæ alive so as to identify the species. It is probable that several species of *Sciara* have this strange habit but I am not aware that anyone has ever reared to maturity and published the name of the American species. Unfortunately most people who have the opportunity, like those who put salt on the larvæ seen by Mr. Willing, are much more likely to practise the stupid habit of destroying everything they do not quite understand instead of trying to learn a little more about it.

J. FLETCHER.

Among the latest contributions to the Herbarium of the Normal School is a very beautiful collection of 100 mounted Botanical specimens illustrating the flora of the Rocky Mountains in the vicinity of Banff, presented to the herbarium by Dr. Jas. Fletcher. The Normal School herbarium already contains a fine series of the plants of the vicinity of Ottawa, and this latest contribution not only adds greatly to the value of the herbarium, but these western plants will enable students to compare eastern with western forms in the same genera.

S. B. S.

REVIEWS.

"REMINISCENCES AMONG THE ROCKS : In Connection with the Geological Survey of Canada"; by Thomas C. Weston, F. G. S. A., Toronto, Warwick Bros. and Rutter, 1899.

The above is the title of a very neat and attractive little volume written by one of the few survivors of the early and pioneer days of geological research in Canada, and also a member of our club of many years standing. Mr. Weston's work brought him in contact with many interesting places and personalities throughout the Dominion. The plain, unconventional way in which he has presented the numerous amusing anecdotes as well as attractive records of scientific work, selected from a pile of official note-books kept by him during the thirty-seven years of his connection with that branch of the Canadian service, commends the volume to the reading public as one of special interest. Whilst disclaiming all literary skill, the author describes many an amusing incident such as are but seldom recorded or described from a geologist's standpoint, but which are nevertheless full of interest and merriment. The brief biographical sketches of Sir Wm. Logan, Dr. T. Stenny Hunt, E. Billings, Alex. Murray, Scott Barlow, E. Hartley, Horace Smith, and many others, including "Michael" and many other characters met by Mr. Weston during his very extensive travels, lend that peculiar personal charm to the volume which always attaches to reminiscences.

The book is of special value to the working geologist and palæontologist who desires to know the best type localities for obtaining suites of fossils with which to illustrate the fauna and flora of the sedimentary formations of Canada. Mr. Weston has, perhaps more than any other officer of the Geological Survey of Canada, contributed to the vast number of specimens now contained in the National Museum at Ottawa, and the notes he has given us in systematic and chronological order, from the time he first joined the Survey under Sir Wm. Logan, until his recent superannuation, will be read with much interest. We commend this volume to all members of the Ottawa Field Naturalists' Club.

H. M. A.

CENTRAL EXPERIMENTAL FARM ; REPORT OF THE ENTOMOLOGIST
AND BOTANIST, 1898. (James Fletcher, LL. D., F.R.S.C.)

This very interesting and valuable contribution to the Annual Report on Experimental Farms, includes pages 167 to 219, of that publication, and is illustrated by 25 figures. It furnishes a very comprehensive review of the more important insect enemies of the past year, and contains also Mr. Fixter's report on the Apiary. The insects are dealt with under the heading of the several crops chiefly injured by them, and the various chapters contain many original observations on the species discussed. The absence of Dr. Fletcher during two months of the summer, while enabling him to do valuable work by lecturing at so many farmers' meetings in Manitoba, the Northwest Territories and British Columbia, must necessarily have lessened his opportunities for completing some of his investigations.

CEREALS.—The worst pests of the grain crops were the Midge, Hessian Fly, Wheat-stem Maggot, American Frit-fly, Grain Aphis, Joint-worms (*Isosoma*) and Cut-worms. In Southern Manitoba there was considerable damage caused by the Rocky Mountain Locust. Several districts were visited by Dr. Fletcher, who recommends ploughing under the eggs, and also the use of poisoned bran, which has been found so useful in destroying cut-worms. VEGETABLES and ROOT CROPS seemed to have suffered less than in previous years, but the Black Army-worm was destructive in some districts, and cut-worms, as usual, occasioned a considerable damage. Among other pests are the Pea Moth, Pea and Bean Weevils, Carrot Rust-fly, Turnip Aphis, Root Maggots, White Grubs and Wire-worms.

FRUITS.—This important crop was in general a good one, and was not especially injured by insects. Many of the fruits, including plums and peaches, were attacked, however, by various blights and other fungous diseases. The most noticeable insects were the Apple Fruit-miner and the Plum-Moth (or Lesser Apple-worm) in British Columbia, and the Tent Caterpillars generally. The Plum Curculio and the Green Fruit-worms (*Xylina*) and Apple Aphis caused considerable loss in some sections. One of the most interesting appearances was that of a hitherto rare beetle (*Xylocrus Agassizii*, Lec.) in Victoria, infesting the roots of

gooseberry bushes. Dr. Fletcher describes this insect very fully under the name of the Black Gooseberry-borer, and gives excellent illustrations of its different stages and of its work. It will be remembered that the drawings from which these figures were made were exhibited at one of the Club Soirées. The most important insect, however, and one which has received very marked attention in this province, is the San José Scale, which, in spite of the vigorous action taken by the Ontario Department of Agriculture, has continued to extend its area of infestation. A very instructive chapter on spraying concludes the report, which is a most valuable addition to those previously published by the author. Now that the Chemist and his laboratory have been provided with a new building, there will undoubtedly be more room allotted to the entomologist and with increased assistance, he will be in a better position to carry on investigations which are of such practical importance, not only to the agricultural class, but to the entire community, which subsists upon the products which reward the labours of the farmer. When the crops are lessened or deteriorated through insect depredations, the welfare of the whole country must correspondingly suffer. Hence the necessity for investigating such depredations and of devising simple and efficient remedies for checking them—W.H.H.

WINTER SOIRÉES.

The Soirée Committee will meet during the present week for the purpose of preparing the lecture programme for the winter months. Arrangements have been made for several interesting papers but as the members of the committee cannot personally call upon all the members of the club, they ask that those who have prepared papers, or are willing to do so, communicate their titles to some member of the committee at as early a date as possible.

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NOTES ON A GEOLOGICAL TRIP OVER A PORTION OF THE CANADIAN NORTHWEST TERRITORIES.

BY T. C. WESTON, F.G.S.A.*

It was my privilege while a member of the Geological Survey of Canada to be assigned, in 1889, the task of exploring and collecting objects in natural history and archæology from the banks of those portions of the Red Deer and South Saskatchewan rivers lying between the fifth principal meridian and the South Saskatchewan landing, a distance of about four hundred miles; but taking in the hundreds of small turns in those rivers, probably double that distance. Taking the Canadian Pacific train from Ottawa to Winnipeg—that wonderful city which has sprung up within the last few years—we continued by the same line to Calgary, which is close to the beautiful Bow River, 2,142 miles from the capital of the Dominion of Canada, in sight of the Rocky Mountains, and 3,413 feet above the ocean. The city of Calgary stands on a beautiful plateau which only a few years ago was the favorite camping ground of those war-making Blackfoot Indians, a portion of which tribe occupies a reservation a short distance from Calgary, while others of the same tribe camp on the outside of town, preferring to pick up a precarious living rather than be confined in the reservation provided for them by the Canadian Government.

Here I find my half-breed Indian, Mackenzie, with wagon and horses. He has come from his home on the banks of the Red Deer, a hundred miles from this, to meet and accompany me

* Portions of this paper have been published in another form in Mr. Weston's "Reminiscences Among the Rocks."

on a long journey across the plains and down a river where very few white men have been ; and which with regard to its fossil fauna and flora, is scarcely known. While waiting for a portion of our camp equipment, Mackenzie and I spent a day or so in examining the rocks about a mile from the C. P. R. depot and within a few feet of the Elbow River. This is our first exposure of the Laramie formation, a division of the great geological column which forms the upper part of the Cretaceous and the lower part of the Tertiary. The Laramie rocks we were about to examine are composed of fine and coarse sandstones, conglomerates, sands, silts, clays and lignite coals, detailed descriptions of which may be found in the reports of the Geological Survey of Canada. We find here, as I have said, our first exposure of the Laramie rocks, an escarpment called the "Hog's Back." It is a cliff of about 100 feet in height; the upper part is a coarse gravel and the lower portion a fine grained yellowish sandstone, which has been used in the construction of buildings. It is in this sandstone we find our first fossils, remarkably well preserved plants, characteristic forms of the Upper Laramie formation. The rocks here have acted beautifully as a botanical press, for some of the leaves are as perfect as when they fell from the trees untold ages ago. Sir J. W. Dawson says (Trans. Royal Soc. Can., Sec IV., 1889): "They belong to two species, *Populus Richardsonii*, and *Quercus platuma*." The latter species is represented by leaves of great size, one of which is twelve inches in length without the petiole. These leaves are not unlike the leaves of our largest species of poplar, and it is supposed that the climate at the time when they grew was similar to that of the present day. These rare examples of the fossil flora of our Laramie rocks may be seen in the cases of the Geological Museum, Ottawa. But we must leave Calgary with all its interesting associations of Indian and prairie life and start on our journey. We have 100 miles to make before reaching Mackenzie's farm on the banks of the Red Deer River, about eight miles below the Edmonton and Calgary crossing.

With a good stout wagon, two horses, provisions for two months, ammunition, guns and camp equipment, we leave Calgary at 2 p.m., June 10th, take the Edmonton trail and at 8 p.m. arrive at our first stopping place—McPherson's, which is situated

in a verdant valley through which Nose Creek runs. It is twenty-two miles from Calgary, 193 miles from Edmonton and over 3,400 feet above the sea. This is a ranch farm and we receive, as every traveller does, a hearty welcome from the ranchmen (women there are none), and after supper roll ourselves in our blankets, tumble down on the floor and soon sleep soundly till the blowing of a horn calls us to breakfast. At daylight Mac finds that his horses, which were picketed in a green spot of prairie grass near the farm have drawn their pickets and left. After a ride of several miles Mac finds them quietly making their way homeward. At 10 a.m. we leave this rough but hospitable prairie farm and are again on our journey. Our nights till we reach Mackenzie's farm are spent under canvas. Space will not allow of a detailed description of the many interesting incidents which occur in a journey across the Northwest plains. On the third morning we leave the Edmonton trail, or main road, strike across the country and at sun-set arrive at the Red Deer River, which in places is a rapid and turbid stream rising and falling suddenly according to the melting of the snow in the mountains. Mac's practised eye sees at a glance that the water has risen two feet since he left home, and that we cannot cross here with our outfit. Mac is a man of few words, and says, "Keep a tight hold on the horses till I return." Tired after the day's journey, the rushing of the water, barking of several prairie wolves in the distance, together with the anxiety of the horses to get to their stable opposite, makes me a little nervous; but in a short time Mackenzie returns and says, "We can cross lower down," and soon our horses plunge into the stream; the water covers the floor of the waggon, but in a few moments we are safely over, and in a short time at the door of Mackenzie's house, where we receive a warm greeting from Mrs. Mac and her numerous family who are all typical specimens of the half-breeds of this locality. At the time of my visit, with the exception of the Rev. Leo Gaetz's farm—a little higher up the river—this is the best farm to be found for many miles; wheat, oats, in fact any farm produce can be raised here with little tilling of the land. It is the last farm on the banks of the Red Deer we shall see for probably a month.

The source of the Red Deer River is in one of the ranges of the Rocky Mountains in lat. $51^{\circ} 30'$, long. 116° W., and flowing eastward joins the South Saskatchewan near the fourth principal meridian. The following morning after reaching the Mackenzie farm I find it will be two or three days before we can start down the river, so embrace the opportunity offered to visit the village, eight miles up stream, which place we reach by crossing the river on horseback and proceeding along its east bank. Here at the Calgary-Edmonton crossing the stream is rapid and over 470 feet wide. On the east side is situated Red Deer Village, which at that time (1889) consisted of two general stores, one log cabin boarding house and a few other buildings. The principal trade done by the stores is with the half-breed freighters who are constantly passing to and fro between Calgary and Edmonton, a distance of about 170 miles. The country here is beautiful, consisting of rich dark loamy prairie lands broken by clusters of spruce, poplar and other trees. The variety and beauty of the wild flowers are remarkable and makes one loath to leave so charming a spot. But we must return to the Mackenzie farm where Mac and another half-breed are busy calking and pitching the two boats which are to carry us hundreds of miles down part of two remarkable streams. Our boats have been made by half-breed Indians during the spring; they are made of half and one inch planks sawn from trees which grow on the banks of the river in this vicinity. They are rough flat-bottomed boats constructed specially for the journey we are to make.

From the Red Deer Village crossing, eight miles up stream, the river is very crooked with, in places, "cut banks" of alluvial deposits, clays, gravels, and laminated beds in which we found pieces of wood, leaves, and fragments of bone; one seemed to be part of the succrum of a buffalo; it was found with some flint chip-pings five feet below the surface. A few miles below the Red Deer Village crossing the Blind Man River enters the Red Deer between high "cut banks" and sloping wooded land. This is an interesting locality, as here we find in the calcareous clay slates beautifully preserved leaves of exogenous plants, some of which are closely allied to certain species of plants of the present day. With these are associated several species of delicate ferns and grasses belong-

ing to the endogenous family. They have been carefully pressed in nature's story-book, and are as perfect as when they fell in those bygone ages, before the probably 20,000 feet of rock, which has been formed since, covered them; in those ages when the gigantic saurians roamed these plains. But we leave this interesting spot where we have obtained some good photographs and bagged many fine specimens of the fossil flora of these rocks, and hasten back to the Mackenzie farm where soon all our traps are on board. We have divided our camp equipment in case of accidents, which may happen at any time while navigating this rapid stream. Reid—a sturdy half-breed who has had much rough experience on some of our Ontario lakes and rivers—is to take the lightest of our two boats and during the journey to take the lead, while Mackenzie and I are to follow. It is 2 p.m. on a lovely June afternoon when we step aboard our rudely made craft and loosen them from their moorings. The current here is very swift, and the moment our boats are loose they glide swiftly down the stream and in a few minutes we are in one of the most dangerous bits of navigation we shall probably encounter. It is what is locally known as the canon. High and in places scarped banks come close to the margin of the river forming a deep gorge through which a large body of water rushes over and between quartzite and other boulders. It is a dangerous spot, and I hold my breath as a large wave dashes our boat against a projecting rock, but fortunately little injury is done, and our boat shoots stern first through the remainder of these turbulent waters, and soon we are out of the canon and gliding over a series of light rapids.

Below this the valley is open and patches of large spruce occupy the sides of the stream, while in other spots poplar, grey willow and other trees form dense shelters for the many wild animals which still inhabit this section of the Northwest. Open patches and wooded lands continue till we reach Tail Creek, township 37, range 24, west of the fourth initial meridian, District of Alberta. We have now reached a most important economic locality, for here are high banks of Lignite coal. The top beds are partly obscured by drift deposits or land slides. Taking the various seams—the thickest of which is about eighty feet—there is a depth of forty-five to fifty feet seen above the level of the

river, and below the level of the water these beds may extend for a hundred feet. At this time (1889) no attempt had been made to work these valuable coal fields. In many of the coal banks of this locality through combustion or from fires started by Indians, an enormous amount of coal has been burned, leaving the hard shaly beds which intercept the seams, various shades of color from a bright red to a dark yellow. The stratification is so marked and the colors so brilliant that we called one spot Vermilion Point. Opposite the largest of these coal deposits is a fine alluvial flat of several hundred acres—a splendid town site, waiting the time when the “iron horse” and busy hands will utilize this nature’s gift to man. For miles lower down the river we pass extensive coal banks, all showing more or less the marks of fire. The river is smooth with numerous shoal rapids and free from boulders.

GOLD.

Gold can be washed out from many of the alluvial deposits of this river and most of the sand-bars of the Red Deer will yield gold in small quantities. A sand-bar near our starting point on this river yielded to an expert at panning from one to two dollars a day. It is supposed that the gold in the Red Deer and other rivers of the Northwest has been washed from the soft rocks which formed the banks of these rivers, having in the first place been derived from the quartzite and other rocks of the Rocky Mountains.

IRON.

Clay ironstone is met with in thin beds and as nodules which contain a percentage of metallic iron. Both shells and plants are found in this ironstone; one nodule we found contained a curious member of the lobster family. We have now reached “Tail Creek” a stream of about twenty feet wide, the outlet of Buffalo Lake, to which a small band of Cree Indians we have just met are bound. They have heard that two buffaloes have been seen in that vicinity and are making their way to the big lake to try and capture them. These Indians are very poor. Two sturdy members of the band stripped and swam the river to our camp with the hope of getting a little food. Here, alluvial banks of from one to two hundred feet high occupy the north side of the river, while on the south

side fine flats for agricultural purposes are seen. All these flats are well timbered with black poplar, cotton-wood, birch and spruce. We have made about thirty miles to-day. During most of the time a flock of wild geese has kept ahead of our boats. Two of their number lie on the bottom of my boat, but the sound of our gun and the loss of their comrades does not give them sense enough to take to the woods. These geese feed on a short mossy grass which grows on the muddy shore of the river. During the last two or three days I have been charmed by the singing of many small birds, and for the last two days we have constantly heard the cooing of the mourning-dove. Several bald eagles have been seen, two species of owls, and a numerous variety of small birds. During our night camps we have frequently heard the barking of the coyotes or prairie wolves; one passed us on the shore of the river this morning. He was evidently looking for a breakfast of goose. On the shores of this stream we have seen the tracks of a grizzly bear, many tracks of deer and small rodents. Several beaver dams have been passed during the day, and one fine fellow slid into the water as we approached his dam. The river afforded us a good supply of white-fish, "gold eyes," the only species we have caught so far. Some evenings the river appears to be crowded with them; twenty fine specimens were caught by one man in an hour. Although we have expected to meet with rattle snakes—as I have in similar lands of the Northwest—we have fortunately escaped so far. The geological formation we have been passing over for a few days is known as the Edmonton sub-division of the Laramie, but we are now in another division of the Cretaceous formation, and are fairly in the "Bad Lands."

We have passed through, in many respects, a charming country. High cut and scarped banks of yellowish weathering sandstones and other deposits which have yielded many interesting fossils and other objects in natural history. We have passed through valleys from six to eight hundred feet deep which in places slope gradually down from the prairie land to fine alluvial flats where a few years ago great herds of buffalo rested after their journey across the plains. Many of the buffalo tracks seen on the sloping sides of the banks and down the sides of the great coulées

are as distinct as if only made a few months ago. All the buffalo trails crossing the plains lead to water, and are narrow, showing that when they travelled they always went in single file or as it is called, in Indian file. Occasionally when the river widens out considerably the water is very shallow, passing over beds of quicksand and ooze, in which our boats frequently stuck, causing trouble to get them out before the drifting sand accumulated around and imbedded them. An incident which occurred to the writer a little later in our journey, may be mentioned here. In one of the great coulées of these Bad Lands I found it necessary to cross the bed of a small brook which leads from the table-land but which, like most small creeks at this season of the year, was dry, with a bottom apparently of hard sandy clay, on which I stepped, reaching about the middle of the brook, when to my surprise my leg sank up to my knee; placing my other foot down that also sank, and before I could throw myself forward I had sunk up to the bottom of my waistcoat. Fortunately, however, I managed to grab a sage-bush on the margin of the brook and with difficulty pull myself out of the cold slimy sandy ooze. One of my men after sounding the depth with a ten-foot pole remarked: "If you had not grabbed that bush only your hat would have been left, but we should have known where you had gone."

ISLANDS.

We passed many small islands, all more or less wooded and covered with rich verdure of grasses and shrubs. Towards sunset as our boats glide past some of these green spots, often surrounded by clear rippling water, we hear the cooing of the dove and the songs of numerous small birds, and forget the troubles and anxieties we have had in bringing our boats through the shallow waters and quicksands.

"BAD LANDS."

For the past two or three days we have been passing through the "Bad Lands" of this locality. The river averages about 900 feet wide with valleys 500 to 700 feet deep. On both sides are high buttes and long stretches of steep banks composed of sands, clays and sandstones. Wild sage, cactus and a few grasses appear to be all the vegetation these lands will support. These desert

lands, however, are precious to the geologist and osteologist, for here was the home of the great dinosaurian, a huge kangaroo-like reptile, probably from forty to sixty feet long and which as one writer says "rivalled in bulk the yet future mammoth and mastodon."

To-day we have collected from these sands and sandstones many important remains of this great reptile. Here on this slab of sandstone is the right and left lower jaw, each about eight inches long. One ramus partly covers the other, hiding the teeth, but in the upper jaw the teeth are almost perfectly preserved, and show that this creature, which existed—well, say 2,000,000 years before man trod this earth—was a carnivorous animal, for the teeth are flattened, serrated, and taper to a sharp point, showing that they were formed for cutting and tearing flesh; the enamel is as perfect as when used. With these jaws—which lie on the roof of the cranium—were found several claws—powerful talons; dangerous weapons they must have been; these, with the teeth, make one think of Tennyson's lines:

"Monsters of the prime,
Who tear each other in their slime."

Here is a femur or thigh-bone we have dug out of the hard sand. It is almost five feet long and too heavy for me to lift, but when lifted by two men crumbled into a thousand fragments. I had risked much to obtain this bone, and to see it crumble to fragments was very annoying. But we have portions of similar bones which are perfectly silicified and retain all the bony structure—Haversian canals, &c., as in recent bone; a thin slice of our fossil makes an interesting microscopic object. Other bones of the fore limbs show that they were small like those of the kangaroo, almost useless for walking. This creature must have squatted on its hind legs and supported itself partly on its heavy tail. Numerous vertebra bones were found on these sandy buttes and plains. Some dorsal and lumbar bones are three times larger than the largest vertebra of the buffalo. Other cordal looking vertebra which probably belong to the same beast taper in size to an inch in diameter. Overlying the sandstone which contained the lower jaws, cranium and other bones just spoken of, was a thin bed of hard sandstone holding on one side leaves of an exogenous tree,

and on the other side were ripple marks showing that the wind blew over the waters and the leaves fell in those untold ages ago. I should like to linger many more days among these relics of creatures never seen by the eyes of man, but my men are getting uneasy and wish to get back to civilization, so we must leave the graves of these great saurians and hasten toward the more fertile banks of the South Saskatchewan.

Continuing our journey we glide quickly, and as my man remarks, gracefully down stream. It is a lovely morning, and but for the twittering of birds and rippling of water is as "quiet as a grave." But turning a sharp angle of the river we come suddenly on a large flock of wild geese which are feeding on the short mossy grass of the shore. I am not a sportsman and hate to kill anything, but Mac says we are getting short of grub, and hands me the gun. I fire and four fall. The skeleton of one is in the Dominion Museum, Ottawa. A little further on we pass three hungry looking coyotes making their way along the shore. We pass several small islands all well covered with rich vegetation. Suddenly the river widens out and becomes so shallow and full of sand-bars that we only make two miles in six hours, then we glide into a rapid stream and make ten miles in the afternoon.

Geologically this is not an interesting locality. Clay and sand banks occupy both sides of the river. It is evidently a good home for the beaver, for we have seen three and several beaver dams. We still hear the twittering of many small birds and the cooing of the dove, a large bald-headed eagle wings its flight over our heads, and in the twilight of the evening we hear the croaky cry of the big grey owl.

Sunday, July 14th, we reach the confluence of the Red Deer and South Saskatchewan rivers, and on the 19th we pitch our tents on the shore near the Battleford and Swift Current crossing. Here there is a mounted police "shack," and we greet the first white man we have seen since we left our starting point nearly two months ago, and here we store our boxes of precious fossils. At day-break next morning we are in our boats again and in an hour or so pitch our last camp opposite the mouth of Swift Current. To the palæontologist this is an exceedingly interesting spot. High buttes of dark-colored shales, clays and sands—rocks

belonging to the Pierre shales, a subdivision of the Cretaceous and part of the Laramie formation, but lower in the horizon than the Laramie and Belly River formation from which our dinosaurian remains come from, are rich in fossils. Here in a bed of dark-colored sandstone is a bivalve shell. It belongs to the genus *Inoceromus*, measures thirteen inches from apex to base and fourteen inches across the widest part. The mollusk these shells contained must have weighed four or five pounds and no doubt would have been good eating had there been any one to eat them. Here is a large convoluted shell, an Ammonite. It belongs to the Nautilidæ family, is sixteen inches in diameter and the test or shell still retains all the beautiful opalescent colors, blended together like the colors of the rainbow ; and here is a little bivalve called *Lipistha undulata* that will almost lie in one of the furrows of our *Inoceromus*. But I cannot mention here the names of the numerous fossils these rocks contain, and must ask the reader of these notes, should he have an opportunity to visit the Geological Survey Museum, Ottawa, not to miss seeing some of the specimens taken from these, at first sight, barren rocks.

Our work here is now finished and we pull our boats well up on shore hoping they may be of use to some other geological investigators, and return to the crossing by freighter's cart, sent for us by the mounted police, who kindly stored our other fossils. It would take pages to describe the beauty of the rivers we have been drifting down for more than a month. The turbid state of these streams after heavy rains, and the difficulty of navigating the shallow places are of course a drawback, but with these exceptions I know of no more delightful spots in this section of our Northwest Territories. To the geologist, palæontologist and botanist the banks of these rivers offer abundant food for the mind ; to the artist and sportsman rich fields for pencil and gun. Our journey from the Battleford and Edmonton crossing to the C. P. R. was made in freighters' carts.

MY FEATHERED JESTER.

BY A. C. TYNDALL.

If anyone who has recognised the leading characteristics of that problem of humanity known in the abstract as the Boy—whose manners and habits suggest not more an absorbing interest in life and all that belongs thereto, than an emulative admiration for the ways and works, in his lighter moods, of the great enemy of mankind—if such a one I say can imagine a like joyous spirit embodied in a feathered person some eighteen inches from beak to tip of tail, he or she will have a fair idea of the individual whose manners and habits have impressed the writer as entitling him to more than a passing notice.

The subject of this biography is, to all appearances, one of those rarely met with and most enviable of mortals who find their lot in life entirely to their liking. He displays an amount of energy and an enthusiasm in his daily doings, whether his occupation be seeking a suitable place of burial for a toad he has slain or that of arranging his toilet in an elm top, which I feel sure entitle him to a high place in the esteem of that gifted bard who sings untiringly the praise of “things as they are.” This is not because he views life with the eyes of the unsophisticated denizen of the wilds. His earliest recollections of life on this planet being associated with his surroundings as a privileged member of the family circle, it may be regarded as a pardonable mistake on the part of this, in some respects, amiable bird, to suppose, as he evidently does, that it is the ties of blood which unite him to the friends of his youth of a widely different description zoologically. Nothing at all cares he for the opinion of his black-coated brothers, though they jeer and scoff at him for a corvine molly-coddle, since he prefers civilization and its luxuries to the joys of the life Bohemian and the companionship of the birds of ill omen.

It is, I believe, not often that anyone meeting a member of the crow family daily fails to be impressed by the force of character and amount of will power—not infrequently wrongly exercised—common to the crow kind, independently of difference in species or sub-species. And although my feathered friend is responsible

for many acts which to say the least are inadvisable, as when, for instance, his taunting yells and peals of loud laughter on the occasion of a passing funeral cortege, bring upon his friends and benefactors the opprobrium of ill-timed mirth, since it is only by the very few that the voice can be recognised as belonging to "that crow," it must be said that none of the misdoings which bring him into disfavor with those around him suggest the weak character unfitted to resist temptation, but rather the strong, though erring spirit, governed by the conviction that whatever presents itself as being the most desirable, is the one thing possible to do.

He has lately fallen into the prevailing error of the age, and is apparently firmly persuaded that he, the individual, has a mission in life, and is called upon to institute reform in such habits among his fellow-creatures as his judgment pronounces as productive of no beneficial results.

The form this idea takes at present is seen in his determined efforts to fix in every one who comes within the sphere of his influence the habit of early rising. This self-imposed task is a heavy one as he is well aware, but he does not shrink from it, and his earnest entreaties, made at an hour when the air is as dark as night can make it, meeting with no response, in growing indignation, with the appearance of the sun his tones change to those of stern command, and these alike failing to produce the desired results, he, as a last resource, seeks an open window to try upon the sluggard the effects of a strong, sharp beak.

However, the errors which call forth the most severe censure from those responsible in some degree for his actions belong to his pastimes. He has a most reprehensible habit of concealing himself in a tree by the roadside, and from there greeting the passer-by with fearful yells and such exclamations as "Ow wow, ow wow"—sounds suggestive of nothing so much as the interesting sufferer in the dentist's chair; while the peals of loud laughter, seemingly having for their cause the personal appearance of the objects of his attention—not seldom both alarms and offends. His persistent indulgence in these objectionable forms of amusement frequently results in a coolness between himself and his chosen friends, although it is only fair to say that in these leisure moments he devotes to experimenting on the variety of sounds his

vocal chords are capable of producing, he can be highly entertaining, especially—but in justice be it said that he is not often guilty of such weakness—when his mood leads him to believe he is endowed with the gift of song.

It would be superfluous to offer anyone, be his or her knowledge of avian talents and attainments ever so slight, the information that the crow does not rank with the song birds. It may not be so well known, however, that this fact is not always recognised by this otherwise up-to-date bird himself; but the range of tones presented in the guttural chucklings, the tuneless liltings in a falsetto voice—suggestive though they always are, of a mind free from care—besides the yells already described, and other sounds indescribable, which go to make up the recitals of my would-be songster—have at least the merit of being something out of the beaten path of bird minstrelsy. The public is cordially invited to be present at these performances, which generally take place in the midst of a group of stout evergreens in the garden, the principal performer not being, to all appearances, troubled by any doubts of his popularity as an entertainer. It disturbs his equanimity not the slightest to know that his methods are regarded with the strongest disapproval by the regularly qualified songsters around him, who, he cannot but be aware, never fail to take themselves out of hearing when he starts his overture—usually a series of terrific yells. He continues with unruffled serenity, until suddenly losing interest in this means of passing the time pleasantly, he drops from his tree and appears before the presiding genius of the kitchen with a demand for refreshments.

Such are some of the distinguishing characteristics and daily occupations of my feathered jester, Jim Crow.

The Soirée Committee met last week and prepared a tentative programme which will be completed this week. It was decided to hold the first soirée on Nov. 28th. A feature of this season's programme will be the unusually large number of illustrated lectures.

NOTES ON SOME BOTANIC GARDENS.

BY W. T. MACOUN.

A few weeks ago the writer visited several of the Botanic Gardens in the United States, also the Arnold Arboretum at Boston, Mass., in the hope of learning something which could be put into practice in our own Arboretum and Botanic Garden at Ottawa. A few facts regarding these places may not be without interest to readers of THE OTTAWA NATURALIST.

NEW YORK BOTANIC GARDEN.

The New York Botanical Garden is of very recent origin. It was in 1895, only, that the \$250,000 subscriptions were guaranteed which were necessary before the 250 acres of land in the northern part of Bronx Park could be handed over by the City of New York. After that the plans for the development of the garden had to be made which included the construction of large buildings to be used for museum purposes and plant houses. These buildings, which are now in course of erection, will be among the finest of their kind. Bronx Park is naturally well wooded. A picturesque stream runs through part of it and adds much to the beauty of the landscape. A fine collection of herbaceous plants has already been brought together. They have been neatly labelled and arranged in botanical order in beds. The planting of trees has not yet been very extensive, but doubtless will be before long. In the fruticetum the shrubs have been arranged in beds as on the herbaceous grounds, but as yet only a limited number have been planted. A large force of men is at present engaged in making roadways, levelling, filling in, etc., and it is evident from the scope of the work that it is the intention to make this one of the finest botanic gardens in the world.

ARNOLD ARBORETUM.

The Arnold Arboretum at Jamaica Plain, Boston, Mass., occupies more than 200 acres of land. It is southwest of the city of Boston proper, and is in the course of the great parkway system of that city. Work was begun in this arboretum more than twenty years ago, so that some of the trees planted there have

reached a considerable size. The arboretum is naturally well wooded, the land is very rolling, and magnificent views may be obtained from some of the commanding points of observation. In many places one would not suspect that any artificial planting had been done, as by the system adopted the natural is preserved as much as possible, and it is quite a common thing to see a tree apparently surrounded with a dense undergrowth which on closer inspection will be found to be kept far enough away from the tree to prevent its branches from being injured by too much shade. The thorough manner in which the soil is prepared before the trees are planted in their permanent positions ensures a healthy, vigorous growth. The fruticetum, where the shrubs are arranged in beds of convenient size, is kept in excellent condition, and as this very large collection only occupies a comparatively small area, any shrub is easy of access. In connection with this arboretum there is a fine herbarium which appears to be in good order.

HARVARD BOTANIC GARDEN.

Though only occupying about seven acres of land the Harvard Botanic Garden at Cambridge, Mass., is a credit to the institution to which it belongs. The collection of herbaceous plants there is very complete and is arranged in such a manner that the different species and varieties may be studied with ease. The plants are grouped in botanical order in narrow beds. The labels give the common and scientific names by which the plant is known, also the country of which it is a native. There are a few glass houses in connection with the garden but these are not of great magnitude.

SMITH COLLEGE BOTANIC GARDEN.

A few years ago a botanic garden was laid out in connection with Smith College, Northampton, Mass. The work done so far has been mostly with herbaceous plants, and a good collection has already been formed. Some trees and shrubs have been planted, but as the limited area of the campus will not admit of very extensive planting it is probable that the collection will not be large. There are some fine glass houses here which are kept in good order, as is also the whole botanic garden.

CHRYSOPA LARVA IN A NEW ROLE.

Recently I received from my friend the Rev. Father Burke, of Alberton, Prince Edward Island, one of the curious cocoons of the Lace-winged Fly (*Chrysopa* sp.) with the statement that the larva had bitten a friend of his three times. I was somewhat surprised at this and wrote for further particulars, when, at Father Burke's request, the following interesting letter was written by Mr. John T. Weeks, of Alberton, P.E.I. :

“In reference to the insect forwarded to you by Rev. A. E. Burke, I may say that a few nights before enclosing the insect, my little girl was rehearsing her lesson to me when I felt something bite me on the back of my neck. I put up my hand but could not feel anything. Shortly afterwards I felt another bite, and still could not catch anything. It bit again, and I pulled off my coat and vest and asked my little girl to look if there was anything on the back of my neck. She found the insect in question, and I put my magnifying glass on it, and as it was different from any insect I had ever seen, I brought it to my office to show it to Father Burke, when he suggested that we enclose it to you. It agrees exactly with your drawing in your letter to Father Burke.”

The Lace-winged flies are extremely interesting not only for their predaceous habits which make them rank amongst the most beneficial insects, but from their remarkable transformations. The eggs are beautifully netted and are borne erect on slender hair-like pedicels. The larvæ are active elongated creatures tapering to each end and furnished with long scissor-like hollow mandibles by means of which they seize their prey. This consists, ordinarily, of other insects, chiefly plant lice, of which they destroy enormous numbers. The jaws are hollow, and through them they suck up their liquid food. When full grown these larvæ spin small round pearl-like cocoons, which are remarkable for their exceeding smallness, as compared with the size of the larva which packs itself away inside them, and the large size of the gauzy-winged, golden-eyed, but terribly malodorous fly which emerges from them.

J. FLETCHER.

PRELIMINARY LIST OF THE BATRACHIA OF THE GASPÉ
PENINSULA AND THE MARITIME PROVINCES.

BY PHILLIP COX.

RANA SEPTENTRIONALIS, Baird. Mink Frog.

Common on Gaspé Peninsula. Fairly common in New Brunswick. Does not occur on Prince Edward Island.

RANA FONTINALIS, Le Conte. Spring Frog.

Rather uncommon. Its place taken by *R. septentrionalis* in Gaspé, New Brunswick and Prince Edward Island.

RANA SYLVATICA, Le Conte. Wood Frog.

Rather rare in Gaspé and the Maritime Provinces.

RANA VIRESCENS, Kalm. Green Frog.

Our present knowledge shows this species to be rare in Gaspé and the Maritime Provinces.

RANA PALUSTRIS, Le Conte. Marsh Frog.

Somewhat rare at Grand Pabos. Generally distributed in New Brunswick and Prince Edward Island.

BUFO LENTIGINOSUS AMERICANUS, Le Conte. Toad.

Not very common in Gaspé Peninsula. Found throughout the Maritime Provinces.

DIEMYCTYLUS VIRIDENSCEUS, Raf. Spotted Triton, Newt.

In small ponds in the valley of the Pabos and in lakes draining into the Dartmouth River, Gaspé. Not rare in New Brunswick and Prince Edward Island. The largest specimen seen was taken at Afton Lake, P. E. I.

DESMOGNATHUS FUSCA, (Raf.) Baird.

Larvæ seen in a pond at New Carlisle were, I think, of this species.

PLETHODON ERYTHRONOTUS, (Green.) Baird. Red-backed Salamander.

Not uncommon in the Gaspé Peninsula, New Brunswick and Nova Scotia.

AMBLYSTOMA JEFFERSONIANUM, (Green.) Baird.

Seems to be very rare, for although searched for was only found at Grand River. Common in New Brunswick but the pre-

vailing form is the variety *lateralis* to which the Gaspé salamander is an approximate.

AMBLYSTOMA PUNCTATUM, (Linn.) Baird. Great Spotted Salamander.

Though no specimens were collected in Gaspé, the species described to me by some of the natives must be this one. It seems to be very rare.

NOTE.—The Green Snake and more than one variety of the Garter Snake are found in the region traversed but specimens were not collected. The notes of the Tree Toad were also heard, and judging from reports given me by local observers it must be quite common.

ORNITHOLOGICAL NOTES.

EDITED BY W. T. MACOUN.

Birds are getting scarce once more, now that the winter is approaching, and it will not be long before none but our permanent residents are left. An occasional robin and prairie horned lark may still be seen, however, which, with the juncos twittering in the hedgerows are among the few birds one observes at the Experimental Farm.

Few observers seem to take the field in autumn, a season of the year when there is much to interest a lover of birds. How, when and where the different species assemble prior to their departure; where they roost, what they feed upon, and finally when they depart are among the many interesting facts that could be learned by one who was really desirous of doing so.

CORRECTION.—Miss Harmer desires to make a correction. Later observations convinced her that the bird, which was recorded last spring by her as the White Rumped Shrike was really the Great Northern Shrike.

The following notes have been kindly furnished by Mr. L. Osborne Scott, Winnipeg, Man., and should prove interesting to readers of THE NATURALIST :

“On July 6th, 1899, I was out in the country about twenty-six miles north of Winnipeg, and being out for a walk about 5.30

o'clock in the morning I noticed a bird with an enormous tail (about twelve inches long) sitting on a bare limb of a poplar tree about 100 yards from me. On closer inspection I found it to be opening and closing its tail, and thinking at once of the Scissor-tailed Fly-catcher that I had read about, I took down notes of its plumage (it was quite tame) and looked it up, and am certain it was a Scissor-tailed Fly-catcher. There was a report that it had been seen about eighteen miles west of the same place two years before, but that may be a mistake.

"The Whip-poor-Will left us about the 6th of September.

"There are a lot of Red-breasted Nuthatches in the fir trees in front of the college just now. They are rather rare.

"On the 18th of June I saw four nests of the Evening Grosbeak about one mile north of Winnipeg, near the Red River, in fact right on its bank. The nests were about twelve or fifteen feet from the ground in some grey willows; they were rather flat and slight, made of sticks and roots and lined with smaller roots. There were only two eggs in two nests and one each in the other two. The eggs are more blotched than those of the Red-breasted and not so spotted, and I fancy they are a little smaller. Unfortunately some rascally boys got at them and left only the trees standing.

"I have seen the Evening Grosbeak in flocks of ten to eighty on the Peace River. The Indians say they always build in Saskatoon willows (*Amelanchier*), though I think there are exceptions."

Ottawa, Oct. 23rd, 1899.

BOTANICAL NOTES.

The herbarium of the Geological Survey has recently been enriched by several very interesting collections of plants from remote or little known regions. Chief among these is Prof. Macoun's very complete series of the plants of Sable Island. These number 190 species of flowering plants and about 50 species of cryptogams. Considering the number of shipwrecks in the vicinity of the island it is surprising that the number of introduced plants growing on Sable Island should be so very small. The few

detected grew in the vicinity of houses and had evidently been introduced in seed.

During the past ten years Mr. A. P. Low has brought from the Labrador Peninsula and the coasts and islands of Hudson Bay many hundred species of flowering plants, and each year's collections have filled some gaps in the National Herbarium, besides extending the range of scores of species. In 1898-99, Mr. Low made a survey of the whole northern part of the Labrador coast, much of which had not before been visited by a naturalist. During both seasons large collections of plants were made which will do much to enlarge our knowledge of the flora of that region.

From the vicinity of Dawson, in the Yukon District, Mr. J. B. Tyrrell has just brought in 120 species of flowering plants, the most complete collection which has been received from there. They indicate a warmer climate than is generally supposed to characterize that region, and with the plants collected by Dr. G. M. Dawson, Mr. Wm. Ogilvie and others on the Yukon, they form a very complete series of the flowering plants of the gold fields.

Mr. N. B. Sanson, the energetic caretaker of the Banff Museum, has made this year a large collection of the plants in the vicinity of that place for the Geological Survey. They will be added to from year to year until a complete series has been collected.

J. M. M.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The thirty-sixth annual meeting of the Entomological Society of Ontario was held in the society's rooms, London, Ont., on the 11th and 12th October. Among the active members present were noticed the following: H. H. Lyman, M.A., president, Montreal; Rev. Dr. Bethune, London; Dr. James Fletcher, Dominion Entomologist, Ottawa; Prof. F. M. Webster, Wooster, Ohio, State Entomologist; Rev. Dr. Fyles, Quebec; Arthur Gibson, Ottawa; Prof. C. C. James, Toronto, Deputy Minister of Agriculture for Ontario; Geo. E. Fisher, San José Scale Inspector, Freeman; Prof. Dearness, London; Prof. Lochhead, Guelph; W. E. Saunders (secretary), J. A. Balkwill (treasurer), J. A. Moffatt (curator),

Hy. Saunders, Dr. Law, Prof. Bowman, R. W. Rennie, London.

The whole of the afternoon of the opening session was devoted to a discussion of the San José scale, Prof. Dearnness introducing the subject with a paper in which he traced the introduction of the San José scale into California, and stating that it probably made its first appearance in Ontario about the year 1887. He also gave an interesting account of the trip taken by the San José Scale Commission in visiting the infested districts, and thought that by a judicious application of whale-oil soap the scale might be controlled in Ontario if not altogether eradicated.

Prof. Webster gave the result of his experience in fighting this pest in Ohio, and said that it was of the utmost importance that the work of spraying the infested trees should be controlled by some one man, this man to be responsible for the proper carrying out of this work. The fruit growers not knowing the nature of this scale could not be relied upon, he said, to use the proper solution at the proper time.

Prof. Lochhead gave an account of certain infested orchards in Ontario and was of opinion that the scale would not develop as rapidly in this cold climate as it does in the south. He thought it would be a capital idea if Public School inspectors in the province were supplied with samples of the scale, in order that they might show the same to the school children, pointing out the pernicious character of this insect, and in this manner the public would be informed generally.

Mr. Fisher mentioned that there are only three points in Ontario at which the infestation has extended to any great proportions, and spoke of the great rapidity with which the scale increases. He also spoke of interesting observations which he had made in connection with his endeavors to control this insect.

Dr. Fletcher also referred to the scale as the most dangerous pest fruit growers have to contend against, but stated it could be successfully treated if specialists who understood their work could be secured and fruit growers taught that they and the whole country were concerned. He complimented the Ontario Minister of Agriculture upon the steps taken to stamp out the scale.

Prof. James, representing the Hon. Minister of Agriculture, spoke of the magnitude of the task confronting the Department,

and said that the question was resting like a nightmare upon the heads of the Department at Toronto. Twenty-five thousand dollars would be spent this year in the endeavor to wipe out this pest.

At the close of this session the society passed a unanimous resolution approving of the measures adopted by the Ontario Department of Agriculture, and of the wise and judicious methods the Hon. Minister had adopted for the suppression of the San José scale.

The evening meeting was held in the Y. M. C. A. hall. President Lyman delivered his annual address, Prof. Webster read a paper entitled "One Hundred Years of Entomology in America," Dr. Fletcher gave an illustrated lantern lecture on "Some Familiar Insects," and Prof. Lochhead delivered a short address, also illustrated with lantern pictures, on "Insect Pests of the Garden, Orchard and Farm." Other short addresses were given by Rev. Dr. Fyles and Rev. Dr. Bethune.

During the second day valuable papers were read by Profs. Lochhead, Webster, Fletcher, and Messrs. Fyles, Bethune, Gibson and others, which were much appreciated. Reports of the Montreal, Toronto and Quebec branches were presented, as also those of the different sections of the society, all showing the useful work done by each during the year.

The election of officers for the ensuing year resulted as follows: "President, Rev. Dr. Fyles, Quebec; Vice-President, Prof. Wm. Lochhead, Guelph; Secretary, W. E. Saunders, London; Treasurer, J. A. Balkwill, London; Librarian and Curator, J. A. Moffatt, London; District Directors, W. H. Harrington, Ottawa; J. D. Evans, Trenton; D. G. Cox, Toronto; James Johnston, Bartonville; and R. W. Rennie, London.

The reports of the officers were very gratifying, showing that the society has 552 members, who are scattered throughout the whole world, and that its influence is spreading and being felt in every direction. The following honorary members were elected: Dr. L. O. Howard, U. S. Entomologist, Washington; Prof. Webster, State Entomologist of Ohio; Dr. J. B. Smith, Rutgers College, New Jersey, and Prof. H. F. Wickham, Iowa City, Iowa.

ARTHUR GIBSON,
Central Experimental Farm.

BOOK REVIEW.

"CATALOGUE OF THE TREES AND SHRUBS IN THE ARBORETUM AND BOTANIC GARDEN AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, ONTARIO, CANADA." By Wm. Saunders, LL. D., F. R. S. C., F. L. S., Director of Experimental Farms, and W. T. Macoun, Horticulturist of Central Experimental Farm and Curator of Arboretum. Bulletin No. 2, second series, June, 1899."

In the preface to this catalogue the writers give a short account of the work done in the Arboretum and Botanic Garden of the Central Experimental Farm since its establishment in 1887. From it we learn that no trees or shrubs were planted until 1889 when 200 species were set out followed by additional species each year, until in 1894 the number had reached 600. During the past five years special attention has been given to this branch of the work done at the Central Farm, the total number of species and varieties catalogued amounting to 3,071. Of these, according to the foot-note on the last page of the catalogue, 1,434 have been found to be hardy; 361 half hardy; 232 tender; 307 winter killed and 737 have not been planted long enough to admit of an opinion being given as to their hardiness.

Under each species the date of planting is given as well as the degree of hardiness, and this with the alphabetical arrangement of species which has been adopted will enable anyone to learn at once whether a plant is hardy or not in this region. Apart entirely from its scientific value the catalogue will be of great service to all planters of trees and shrubs in the latitude of Ottawa. The nomenclature of the "Index Kewensis" and "Kew Guide" has been adopted, but care has been taken to include in the synonymy the names under which some of our North American species are more generally known.

The arrangement of the catalogue is excellent and in completeness and general usefulness it is by far the most valuable publication of its kind that has been issued in America.

THE OTTAWA NATURALIST.

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OTTAWA, DECEMBER, 1899.

No. 9.

NOTE ON AN ECHINODERM COLLECTED BY DR. AMI AT BESSERERS, OTTAWA RIVER, IN THE PLEIS- TOCENE (LEDA CLAY).

By SIR J. WILLIAM DAWSON, C.M.G., LL.D., F.R.S.

The specimen is a flattened disc, about three centimetres in diameter, in a circular nodule split open. The central part shows inclined bars or tubercles and remains of slender spines which also fringe the margins pointing mainly in one direction (backward). There are indications of a shallow sinus in front. The spines are flattened and pointed, and show traces of an echinoid cellular structure.

The specimen is probably the flattened test and spines of a spatangoid sea-urchin, which has burrowed in the clay when soft and has been buried up and compressed owing to its not having been penetrated with earthy matter. This mode of preservation renders it impossible to see distinctly the markings on the shell, which are obliterated by flattening or covered with the remains of the spines, making the determination of the genus and species very unsatisfactory.

It may belong to either of the genera *Spatangus*, *Brissus*, or *Amphidotus*, as defined by Forbes for the European species. Looking for it among existing species, I do not know any of this type on our coast, except that *Brissus lyrifer* is said to have been dredged by Goodsir in Davis Straits; but the present specimen does not seem to agree in form with that species. On the east side of the Atlantic, *Spatangus purpureus* extends to Norway, and so does the common *Amphidotus cordatus*. Sars, in his memoir on

the Quaternary fossils of Norway, mentions *Brissus fragilis*, a species which I have not seen, as occurring in the glacial clays of that country (which contain fossils resembling those of the Ottawa clays) and also an undetermined species of *Amphidotus*. The present species may be identical with one of these; but I have no description or figures of Sars' specimens. Perhaps there may be better means of reference to them in the Geological Survey library.

In the meantime I can only say that the specimen probably represents a species of *Spatangus* or *Brissus* which lived in the seas of the Canadian Pleistocene, but which, so far as I know, has not yet been found here in a living state. The fact is another instance of the circumstance which I have noted in papers on the Pleistocene fossils that there is in our Pleistocene marine fauna a North-European aspect, as if at that time the indentations of the two sides of the North Atlantic were more nearly alike than at present.

TWO LAND SHELLS NEW TO THE CANADIAN LIST.

By REV. GEO. W. TAYLOR, M.A., F.R.S.C. (Nanaimo, B.C.)

I have the pleasure of recording two additions to our list of Western Canadian land shells.

One is *Punctum Clappii*, Pilsbry, a little shell very nearly allied to *Punctum conspectum*, but not quite so large. *P. conspectum* is common near Victoria, but apparently does not occur at Nanaimo, in which district *P. Clappii* seems to replace it. This latter shell is quite plentiful all round Nanaimo and on Gabriel's Island and is commonly found among decaying leaves, being especially partial to the dead fronds of *Aspidium munitum*. It is also common in Oregon and Washington Territory, where the type specimens were collected.

The second species I have to record is new not only to Canada but to Science. Three specimens were found by me, in 1895, under pieces of board near the Nanaimo water works, and from these as types Dr. Pilsbry has described *Pristiloma Taylora*. I

have also a single specimen of this species collected on the mainland of British Columbia, near Scotch-fir Point, which is about forty miles north of the island locality; and a few days ago I secured a fifth specimen under some leaves by Nanaimo River, near my present home.

The original description of *P. Clappii* will be found in the *Nautilus*, Vol. XI, p. 133, and that of *P. Taylora* in the current volume of the Proc. Acad. Nat. Sci., Philadelphia.

THE SOLITARY SANDPIPER.—*Totanus solitarius*.

By REV. C. J. YOUNG, Lansdowne, Ont.

Perhaps one of the most interesting of our small Sandpipers is this species, especially to those who, being fond of out-door life, take an occasional stroll by our ponds and creeks in the spring and "fall" of the year. I observe this species almost every year, and find that its migrations are very regular in Eastern Ontario, between the St. Lawrence and Ottawa rivers, where I have seen it. Taking the years from 1887, when I first began to pay attention to the species:—In that year I saw a pair at a wet place near large woods a few miles from the Ottawa River, County Renfrew, on the 10th of May; on the 13th two pairs at the same place, and on the 19th August one bird by a creek not far off. In 1888, I saw one on the 12th of May. The next two years I did not observe it; but coming to the neighborhood of the River St. Lawrence, County Leeds, in 1891, I saw several in a muddy bay off Charleston Lake, doubtless a brood of young ones, on September 3rd. In the same year, not very far from the same lake, I saw one as late as October 29th. That is the latest record I have.

In 1892 I saw the bird rise from a wet place near my house on August 1st, and again on August 3rd. These were probably birds that had stayed in the neighborhood all the summer.

In 1893 I did not see any birds, but in 1894 they were more plentiful than usual, and I saw one or more near the village of Lansdowne on the 15th, 18th and 19th May, and one on the 11th of June.

In 1895, none observed ; in 1896, May 18th, and young ones near Graham's Lake on August 1st. In 1897, none observed ; in 1898, August 15th, one old bird—a very large one. September 1st I shot one at Escott Pond. In 1899, May 11th, observed three at pools in small woods. June 8th saw birds several times at a small creek flowing out of the large marsh on Amherst Island, Ont., into Lake Ontario, and near the creek found nest and three eggs. On June 25th saw one bird rise from a ditch near Lansdowne, and on the 22nd and 25th September saw two and shot one on each of these days at Escott Pond. This completes my record during thirteen years, except that I saw one at Escott Pond in June, and two others close to Lansdowne also in June, but I forgot to note the year. It will therefore be seen that this bird is a regular though comparatively rare migrant in Eastern Ontario ; that it arrives yearly about the middle of May, from the 10th to the 15th, and after staying a week or two, as a rule goes further north, though an occasional pair remains through the summer, and, as I have observed, a brood is now and then brought out.

On its return migration it may be looked for towards the end of August, except in the case of birds that have nested ; and it remains about water-holes and ponds until the end of September, although, as stated, I have one record October 29th.

It may easily be distinguished from the Spotted Sandpiper both on the wing and when feeding, first by its size and glancing flight—its wings are longer than the other species ; next by the amount of white in the outside tail-feathers, which shows when it rises close to a person ; and again by the dark-coloured bill and legs, and longer “tarsi.” The length of the bird I shot on 22nd September was 8 inches, and weight $2\frac{1}{4}$ ounces. Some birds are slightly larger and heavier.

There are some peculiarities about this bird that render it of unusual interest to ornithologists ; for instance, the range of its migrations is imperfectly known ; it is not gregarious, being generally found singly, or in the spring two or three together ; hence the name “solitary” is peculiarly appropriate. Unlike most other sandpipers, it prefers wooded ponds and small creeks fringed with trees ; even a small pool in a wood is frequently resorted to. But most of all, the mystery that surrounds the breeding habits of

the bird is peculiar. Charles Dixon, an English naturalist, whose interesting book—"Non-Indigenous British Birds"—may not be known to many readers, says of this sandpiper (he wrote in 1894): "Incredible as it may seem its nest and eggs still remain unknown to science, for it is impossible to accept the description of the latter given by the late Dr. Brewer without authentication. There can be little doubt that this species lays its eggs in the deserted nests of other birds in low trees, like its old-world representative, the Green Sandpiper, is known to do." Now Mr. Dixon, though a high authority on British birds, seems to write too negatively here, for the egg that Dr. Brewer refers to was found near Lake Bombazine, in Vermont, U.S.A., and the bird shot as it left the nest, which of course implies absolute identification. In the next place our Solitary Sandpiper is rather the nearctic representative of the old-world Wood Sandpiper (*Totanns glareola*) and not the Green Sandpiper (*Totanus odoropsus*), according to Yarrell, ("British Birds," 4th Ed.), and as such breeds on the ground, as is the habit with that species, and not in trees like the Green Sandpiper. Since 1894, the nest is said to have been found several times, notably one by Dr. Clarke of Kingston, in 1898 (*vide* "Auk," Oct., 1898). With regard to the nest I found, in company with Dr. Clarke, we made a trip to a large marsh on the south side of Amherst Island, Ont., in June, 1899. This marsh covers many acres of ground and is accessible according to the nature of the season, whether wet or dry. A creek runs through the middle, and empties into Lake Ontario near what is known as "Nut" Island. The shores of the lake hereabouts are sandy, and near the marsh are fringed with a growth of small poplars and willows. Inside this growth of small trees is a bank of sand and pebbles, beyond which are larger trees such as poplar, soft maple and willows, which grow along the edge of the marsh. It was amongst these trees that I found the sandpiper's nest, among some coarse grass not far from the edge of the creek, and between the lake and the marsh. Close by was a good deal of *Spiraea* and a rank growth of long grass and some reeds. Here we noticed several Black-billed Cuckoos, and two pairs of Maryland Yellow-throats. The bird sat very closely, although the eggs were fresh, and rose almost at my feet. I at once said to myself, "that is not a Spotted Sandpiper," noticing

its glancing flight and lustrous dark colour. I left the eggs and went away for a time in order that I might obtain a second view of the bird. On my return it was back to the nest, and again rose at my feet. This time I noticed the white in the tail very plainly, for as it rose it spread its tail "fan-like," so I felt satisfied that I had correctly identified the species. The Spotted Sandpiper neither sits so close nor shows the white markings on the tail-feathers.

The nest was in a tolerably dry sandy place, and each time the bird left it, she flew to the creek, where she skulked and hid among the long grass, behaving in a manner unlike their habit during the spring and fall migration. It was constructed of bits of bark, moss, grass and rootlets, a considerable quantity of material being used. The three eggs are bluntly pyriform, the ground-colour drab, and the texture of the shell very fine and delicate; in fact so much so that they required very tender handling in blowing. They are spotted all over, the spots and specks varying in size from a pin's head to a small pea: there are no blotches, but a few shell markings. These eggs are a trifle larger than Spotted Sandpiper's, averaging 1.25 x 1.00 inch. Having no gun, we could not secure the bird, a matter for some reasons to be regretted; but the question of identification was as accurate as circumstances would permit, and so sets at rest Mr. Dixon's theory, that this bird does not build its nest on the ground. Further notes and acquaintance with the habits of the species will, however, be of great interest.

GEOLOGICAL NOTE.—To further investigate the Fauna and Flora of the Pleistocene beds in Canada, the General Committee of the British Association for the Advancement of Science has just announced that a further sum of £10 has been placed at the disposal of the Canadian Committee, which consists of the following; *Chairman*, Sir J. W. Dawson; *Secretary*, Prof. A. P. Coleman; Prof. D. P. Penhollow, Dr. H. M. Ami and Mr. G. W. Lamplugh.

BELLINURUS GRANDÆVUS, A NEW SPECIES OF
PALÆOZOIC LIMULOID CRUSTACEAN RECENTLY
DESCRIBED BY PROF. T. R. JONES AND DR. HENRY
WOODWARD, FROM THE EO-CARBONIFEROUS OF
RIVERSDALE, NOVA SCOTIA.

BY H. M. AMI, M.A., F.G.S.

In 1897, while carrying on a palæontological survey of various geological horizons in Nova Scotia with a view of ascertaining the taxonomic relations of the various zones in the formations characterizing the Carboniferous system of that province, I was fortunate enough to find "two tiny specimens of Palæozoic Limuloid Crustaceans." With Dr. G. M. Dawson's permission, these were forwarded to Dr. Henry Woodward, Keeper of the British Museum, South Kensington, the eminent authority on Crustacea, and in a paper recently published* by him conjointly with my friend Prof. T. Rupert Jones, F.R.S., &c., the specimens are described under the name *Bellinurus grandævus*, Jones & Woodward.

This crustacean was obtained from the Riversdale formation, in the greenish grey and rusty shales of the sixth cutting east of Riversdale, Colchester County, Nova Scotia, along the Inter-colonial Railway of Canada. This is the third cutting east of Calvary Brook, which discharges its waters into the Black River branch of the Salmon River. The geological position of this new form is best indicated by the following note on the order of superposition of the strata in the neighbourhood of Riversdale station, in descending order as observed by the writer and as has been clearly pointed out by Mr. Hugh Fletcher, B.A., of the Geological Survey of Canada in various reports : **

1. *Windsor formation*, with marine limestones with gypsum and marls holding abundance of iron pyrites.

*"Contributions to Fossil Crustacea," by Professor T. Rupert Jones, F.R.S., F.G.S., and Henry Woodward, LL.D., F.R.S., F.G.S., *Geol. Mag.*, Dec. IV, Vol. VI, No. 423, p. 388, September, 1899. Plate XV, figs. 2 and 3.

** See *Ann. Rep. Geol. & Nat. His. Surv., Can.* Vol. II, p. 64P, Montreal, 1887.

2. Unconformity.

3. *Union formation*, consisting for the most part of red shales and sandstones, &c., as seen in the excellent rock-cuttings along the I. C. R., near Union Station, eight miles below Riversdale.
4. *Riversdale formation*, marked by black carbonaceous, dark grey and red, greenish-grey and rusty shales and grey sandstones with a few calcareous layers as seen in the numerous cuttings along the I. C. R. east of Riversdale station and in the valleys of the Calvary Brook and Black River.

Considerable discussion has arisen of late as to whether the rocks of the *Union* and *Riversdale* formations belong to the Carboniferous or Devonian systems. After describing the two specimens obtained by the writer, Prof. Jones and Dr. Woodward make the following statement regarding the horizon at which the genus *Bellinurus* usually occurs :

"Although *Bellinurus* is a very ancient type of *Limulus*, it has not at present been found in rocks of earlier age than the Coal-measures, nor can we assert that the black, grey and glossy shales of Riversdale, Colchester County, Nova Scotia, in which these specimens occur, are older than Carboniferous."

Several interesting examples of a species of *Leaia* were found associated with *Bellinurus grandævus* in the black shales of the fifth cutting east of Riversdale station which, after examination, Prof. T. R. Jones refers to his *Leaia Leidyi*. The authors add :

"*Leaia Leidyi*, T. R. Jones, which occurs with *Bellinurus* in these Riversdale black shales, occurs in the Lower Carboniferous of Pennsylvania, but in rocks 'regarded by some geologists as the uppermost part of the Devonian or Old Red Sandstone.'* *Leaia* also occurs in the Upper Coal Measures of Lancashire and the Lower Carboniferous of Fifeshire. As the two specimens of *Bellinurus* (Pl. XV, figs. 2 and 3) are both imperfect, and better materials may at any time be forthcoming, it seems prudent to refrain from suggesting more than one trivial name. This Crustacean may therefore be known as *Bellinurus grandævus*, Jones

*"Fossil Estheriæ," Pal. Soc. Monogr. p. 117, pl. V, figs. 11 and 12. London, 1862.

& Woodw., Lower Carboniferous series, Riversdale, Colchester Co., Nova Scotia.”

NOTE.—Several interesting specimens of a small decapod crustacean allied to *Anthracopalæmon*, Salter, are seen to occur in the more recent collections of fossil organic remains obtained by the writer from the shaly strata of the Riversdale formation on the Harrington River, which forms the boundary between Cumberland and Colchester Counties, in Nova Scotia. All the congeners of this species so far described in North America occur in the Coal Measures, and are therefore distinctly Carboniferous. This affords additional evidence in support of the view that the Riversdale formation is *Carboniferous*.—H.M.A.

LIST OF PLANTS COLLECTED BY MR. J. B. TYRRELL IN THE KLONDIKE REGION IN 1899.

By JOHN MACOUN, M.A. F.L.S., F.R.S.C.

Numerous small collections of plants have, during the past ten or twelve years, been brought from the Yukon District to the Herbarium of the Geological Survey by Government officials and others. These specimens are of great value as showing the distribution of plants known to occur in the wooded regions to the east, and our knowledge of the flora of the Klondike district is almost as complete as that of other parts of Canada. The collection made by Mr. Tyrrell during the spring and summer of 1899 is one of the most complete we have received, and a mere glance at the following list will show that the spring and summer climate in the vicinity of Dawson is as mild as that many degrees further south in Eastern Canada; indeed the great majority of the plants found in meadows, bogs, woods and river-bottoms grow within one hundred miles of Ottawa.

Mr. Tyrrell says of these plants :

“They were all collected in the bottoms, or at no great height up the sides of the valleys, at approximate elevations of between

1,000 and 1,500 feet above sea-level. The principal locality visited on the Yukon River was a gravel hillside, sloping towards the south, within a short distance of the town of Dawson. Another locality was a rocky hill, also facing the south, a couple of miles further up the valley. The localities on Bonanza and Hunker creeks were either on the swampy flats or on the swampy hillsides. Chandindu River was visited once, on July 13th, and the plants, as labelled, were collected either on the wide swampy flat in the bottom of the valley, on a grassy hillside on the north side of the valley, or on a sandy bar at the mouth of the river where it joins the Yukon River. Forty-mile River was visited for a few days between June 29th and August 8th, and the plants were collected close to the banks of the river as we ascended and descended in a canoe."

ANEMONE PATENS, Linn., var. *NUTTALLIANA*, Gray.

Yukon River, in flower May 1st ; Klondike River, April 30th.

ANEMONE PARVIFLORA, Michx.

Hunker Creek, May 30th.

ANEMONE RICHARDSONII, Hook.

Chandindu River, June 13th.

RANUNCULUS MULTIFIDUS, Pursh, var. (?)

Chandindu River.

RANUNCULUS LAPPONICUS, Linn.

Chandindu River, June 13th.

AQUILEGIA BREVISTYLA, Hook.

Chandindu River.

DELPHINIUM SCOPULORUM, Gray.

Chandindu River.

ACONITUM DELPHINIFOLIUM, DC.

40-mile Creek; Chandindu River.

PAPAVER NUDICAULE, Linn.

40-mile Creek. This species is out of range and better specimens may indicate a new species.

CORYDALIS GLAUCA, Pursh.

Chandindu River.

CORYDALIS AUREA, Willd.

Bank of Klondike behind Dawson, June 11th.

NASTURTIIUM PALUSTRE, DC. var. HISPIDUM, Fisch. & Mey.
Chandindu River.

ARABIS HOLBÆLLII, Hornem.
Bank of Klondike behind Dawson, June 11th.

ARABIS LYRATA, var. OCCIDENTALIS, Wat.
Chandindu River.

BARBAREA VULGARIS, var. ARCUATA, Hook.
Chandindu River.

ERYSIMUM CHEIRANTHOIDES, Linn.
Klondike River, June 30th ; Chandindu River.

ERYSIMUM PARVIFLORUM, Nutt.
Bank of Klondike River behind Dawson, June 13th.

ERYSIMUM, Sp.
A specimen in flower was gathered on June 13th on the Chandindu River. The flowers are light yellow and too large for *E. parviflorum* and the young pods are hardly that species. A specimen in flower which seems to be related to *Erysimum* is indeterminable. Chandindu River.

BRASSICA SINAPISTRUM, Boiss.
Introduced. Chandindu River.

DRABA INCANA, DC.
Klondike River, May 16th.

LYCHNIS TRIFLORA, var. DAWSONI, Robinson.
Chandindu River.

CERASTIUM MAXIMUM, Linn.
This species is common in Siberia, and is reported from Alaska. Chandindu River. Our first record.

ARENARIA CAPILLARIS, var. FORMOSA, Fisch.
Chandindu River.

ARENARIA LATERIFLORA, Linn.
Bank of Klondike River behind Dawson, June 11th.

ARENARIA PHYSODES, DC.
40-mile Creek.

STELLARIA BOREALIS, Bigel.
Chandindu River.

LUPINUS ARCTICUS, Watson.

Bank of Yukon River opposite Dawson, May 23rd.

ASTRAGALUS ALPINUS, Linn.

Bank of Klondike behind Dawson, June 11th; also Chandindu River.

ASTRAGALUS FRIGIDUS, var. LITTORALIS, Watson.

Chandindu River.

OXYTROPIS LAMBERTI, Pursh.

Chandindu River.

HEDYSIARUM BOREALE, Nutt.

Chandindu River.

SPIRÆA BETULIFOLIA, Pallas.

Chandindu River.

RUBUS ARCTICUS, var. GRANDIFLORUS, Ledeb.

Chandindu River, June 13th.

POTENTILLA PENNSYLVANICA, var. STRIGOSA, Pursh. (?)

Chandindu River.

POTÉNTILLA NIVEA, Linn.

Dawson, May 14th.

POTENTILLA FRUTICOSA, Linn.

Chandindu River.

POTENTILLA ANSERINA, Linn.

Chandindu River.

POTERIUM SITCHENSE, Watson.

40-mile Creek.

ROSA ACICULARIS, Link.

Chandindu River.

SAXIFRAGA REFLEXA, Hook.

Yukon River, May 1st. Identification doubtful. Specimens too young.

SAXIFRAGA HETERANTHA, Hook.

40-mile Creek.

SAXIFRAGA TRICUSPIDATA, Retz.

Bank of Klondike behind Dawson, June 11th.

CHRYOSPLENIUM ALTERNIFOLIUM, Linn.

40-mile Creek.

PARNASSIA PALUSTRIS, Linn.

40-mile Creek.

RIBES RUBRUM, Linn.

Hunker Creek, May 30th.

RIBES HUDSONIANUM, Richards.

Chandindu River.

EPILOBIUM ANGUSTIFOLIUM, Linn.

40-mile Creek, and Chandindu River.

SILENUM DAWSONI, Coult. & Rose.

Chandindu River.

CORNUS CANADENSIS, Linn.

Chandindu River.

LINNÆA BOREALIS, Gronov.

Chandindu River.

VIBURNUM PARVIFLORUM, Pylaie.

Bank of Klondike behind Dawson, June 11th.

GALIUM TRIFIDUM, Linn.

Chandindu River.

GALIUM BOREALE, Linn.

Chandindu River.

VALERIANA SYLVATICA, Watson.

40-mile Creek ; Chandindu River.

SOLIDAGO MULTIRADIATA, Ait.

Chandindu River.

SOLIDAGO MULTIRADIATA, var. SCOPULORUM, Gray

40-mile Creek.

ASTER SIBIRICUS, Fisch.

40-mile Creek ; Chandindu River.

ERIGERON ACRIS, Linn.

40-mile Creek.

ACHILLEA MILLEFOLIUM, Linn.

Chandindu River.

ARTEMISIA VULGARIS, Linn., var. TILESII, Ledeb.

40-mile Creek ; also Chandindu River.

PETASITES SAGITTATA, Gray.

Bank of Klondike opposite Dawson, May 23rd.

ARNICA ALPINA, Murr.

Bank of Klondike behind Dawson, June 11; also Chandindu River.

CAMPANULA UNIFLORA, Linn.

40-mile Creek.

CAMPANULA ROTUNDIFOLIA, var. ALASKANA, Gray.

Chandindu River; also 40-mile Creek.

VACCINIUM CAESPITOSUM, Michx.

Chandindu River.

VACCINIUM VITIS-IDÆA, Linn.

Chandindu River.

ARCTOSTAPHYLOS ALPINA, Spreng.

Chandindu River.

ARCTOSTAPHYLOS UVA-URSI, Spreng.

Chandindu River.

CASSANDRA CALYCVLATA, Don.

Hunker Creek, May 30th.

ANDROMEDA POLIFOLIA, Linn.

Chandindu River, June 13th.

LEDUM PALUSTRE, Linn.

Chandindu River, June 13th.

LEDUM LATIFOLIUM, Ait.

Chandindu River.

PYROLA ROTUNDIFOLIA, Linn.

Klondike Valley, June 2nd; also Chandindu River, June 13th.

MONESSES UNIFLORA, Gray.

40-mile Creek.

ALLOTROPA VIRGATA, Torr & Gr.

Chandindu River.

ANDROSACE SEPTENTRIONALIS, Linn.

Chandindu River; also Dawson, May 14th.

GENTIANA AMARELLA, var. ACUTA, Hook.

Chandindu River.

POLEMONIUM HUMILE, var. PULCHELLUM, Gray.

Klondike River, May 14th.

MERTENSIA PANICULATA, Don.

Bonanza Creek, May 18th; bank of Klondike behind Dawson,
June 11th.

PENTSTEMON CRISTATUS, Nutt.

Chandindu River. This may be a new species.

CASTILLEIA PALLIDA, Kunth.

40-mile Creek.

PEDICULARIS EUPHRASIOIDES, Stephan.

Chandindu River.

DRACOCEPHALUM PARVIFLORUM, Nutt.

Chandindu River.

CHENOPODIUM CAPITATUM, Benth. & Hook.

Chandindu River.

POLYGONUM ALPINUM, Linn.

Chandindu River.

SHEPHERDIA CANADENSIS, Nutt.

Klondike River, May 14th.

COMANDRA LIVIDA, Richardson.

Chandindu River.

BETULA PAPYRIFERA, Michx.

Yukon River at Dawson, May 1st.

BETULA GLANDULOSA, Michx.

Chandindu River.

ALNUS INCANA, Willd (?)

Yukon River, May 1st. Too young.

SALIX ARCTICA, R. Br.

Chandindu River.

SALIX SCOULERIANA, Bebb.

Yukon River, May 1st.

SALIX RETICULATA, Linn.

Chandindu River.

SALIX ——— (?)

Bank of Klondike behind Dawson, May 21st. Too young.

SALIX ——— (?)

Hunker Creek, May 30th.

POPULUS TREMULOIDES, Michx.

Yukon River, May 1st, and Klondike River, May 16th.

EMPETRUM NIGRUM, Linn.

Bonanza Creek, May 18th.

JUNIPERUS COMMUNIS Linn.

Bank of Klondike behind Dawson, May 21st.

PINUS MURRAYANA, Balfour.

Yukon River, near mouth of Little Salmon River.

PICEA NIGRA, Link.

At Dawson.

PICEA ALBA, (?)

This is one of the forms that do duty for the White Spruce in western America. Yukon River.

CORALLORHIZA INNATA, R. Br.

Chandindu River, June 13th.

CALYPSO BOREALIS, Salisb.

Chandindu River, June 13th.

ALLIUM SCHOENOPRASUM, Linn.

40-mile Creek.

ZYGADENUS ELEGANS, Pursh.

Klondike and Hunker Creek, June 30th.

ERIOPHORUM CAPITATUM, Host.

Bonanza Creek, April 25th; and Hunker Creek, May 30th.

CAREX PYRENAICA, Wahl.

Bank of Klondike behind Dawson, May 21st.

CAREX INVISA, Bailey.

Bank of Yukon River opposite Dawson, May 28th; Hunker Creek, May 30th.

CAREX ——— (?)

Chandindu River. Too young.

CAREX CONCINNA, R. Br.

Chandindu River.

DEYEUXIA PURPURASCENS, Kunth.

Bank of Klondike River behind Dawson, June 11th.

POA PRATENSIS, Linn.

Chandindu River, June 13th.

EQUISETUM ARVENSE, Linn.

Bank of Yukon opposite Dawson, May 23rd.

PELLÆA GRACILIS, Hook.

40-mile Creek

PHEGopteris DRYopteris, Fée.

40-mile Creek.

ASPIDIUM FRAGRANS, Swartz.

Yukon River, May 1st, also 40-mile Creek.

CYSTopteris FRAGILIS, Bernh.

40-mile Creek ; Chandindu River.

CYSTopteris MONTANA, Bernh.

40-mile Creek.

WOODSIA GLABELLA, R. Br.

40-mile Creek.

WOODSIA HYPERBOREA, R. Br.

40-mile Creek.

LYCOPodium OBSCURUM, Linn.

Hunker Creek and all gold creeks.

LYCOPodium ANNOTINUM, Linn, var. *PUNGENS*, Spreng.

Hunker Creek.

LYCOPodium COMPLANATUM, Linn.

Trail along Hunker Creek.

POLYTRICHUM JUNIPERINUM, Willd.

Bank of Yukon River opposite Dawson, May 23rd.

MARCHANTIA POLYMORPHA, Dum.

Dawson.

CETRARIA JUNIPERINA, var. *PINASTRI*, Ach.

Bonanza Creek.

USNEA BARBATA, var. *DASYPOGA*, Fr.

Klondike bank behind Dawson.

ALECTORIA JUBATA, var. *IMPLEXA*, Fr.

Bonanza Creek.

PELTIGERA APHTHOSA, (L.) Hoffm.

Bonanza Creek.

CLADONIA GRACILIS, var. HYBRIDA, Schaer.

Klondike bank behind Dawson.

CLADONIA RANGIFERINA, var. SYLYATICA, Linn.

Bank of Yukon opposite Dawson.

CLADONIA DEFORMIS, (L.) Hoffm.

Klondike Bank behind Dawson.

CLADONIA CORNUCOPIOIDES, (L.) Fr.

Bank of Yukon River opposite Dawson.

REPORT OF THE GEOLOGICAL BRANCH FOR 1898-1899.

To the Council of the Ottawa Field-Naturalists' Club :

In presenting this, the annual report of the work done by this branch of the Club, I have to report that whilst there may have been a considerable amount of individual and official as well as professional work done by many members of the Club in this district, there does not appear to have been a large amount of concerted work in connection with the Club to report this season.

At the various excursions, or sub-excursions, held under the auspices of the Club during the past year, some one or more of your leaders appointed by your Council were present, and assisted in explaining the various geological formations and phenomena occurring in the several localities visited. The following comprise some of the excursions held and localities visited by the Club during the past year :

1. *Chelsea Hills*, north of Ottawa, in a district where rocks of Archæan age occur.

2. *Moore's Landing, Ont.*, at the head of Lake Deschenes, on the edge of the Ordovician system, and where the triple character of the sediments which constitute the Chazy formation may be seen and studied to advantage.

3. *Aylmer, Que.*, where the Chazy formation is also well developed, and has been studied with important results by our member, Mr. T. W. E. Sowter, whose interesting contribution to

ethnological research in the Lake Deschenes district proved so attractive a feature of last winter's programme of soirées given under the auspices of the Club.

Sub-Excursions. Sub-excursions in geology were held at more or less regular intervals and led by leaders appointed last spring. This phase of our Club's work cannot be emphasized too strongly. Experience has proved that this method of carrying on local work is eminently productive of good results.

As an instance of work done at one of the sub-excursions held last summer, I beg to submit the following notes on an examination of the lower measures of the Utica formation in Gloucester. On the banks of the Rideau river and at the head of the old Rifle Range rapids, about half a mile above Cummings's Bridge, for a distance of several hundred feet along the east bank of the Rideau, some twenty-five feet of Lower Utica shales and limestones are exposed in the shape of a low depressed anticline, containing many interesting forms of fossil organic remains. A party of three visited this outcrop, and amongst the best specimens obtained may be mentioned the very prettily ornamented brachiopod, *Schizambon Canadensis*, better known for a number of years under the designation *Siphonotreta Scotica*, Davidson for the first time recorded by Mr. J. F. Whiteaves of the Geol Survey. Besides many of the species already recorded from this locality in a former paper by the writer, two new or undescribed forms of Ostracoda were found in the same bed: these, it is hoped, will shortly be described in the OTTAWA NATURALIST. *Zygospira Heudi*, Billings, a form usually found in the Lorraine formation of eastern Canada, and also recorded from the Cincinnati group or highest Ordovician of Ohio and Kentucky, was also detected in the same bed of impure bituminous limestone containing *Schizambon*. As far as the writer is aware, this is the earliest record of the occurrence of this species at so low an horizon in the Ordovician. It is a rather short and rotund form with very fine, delicate longitudinal ribs, and may prove to be worthy of a new designation. It bears some resemblance and affinities to *Zygospira Anticostiensis*, Billings, from the limestones of a formation equivalent to the Lorraine as developed on Anticosti, in the Gulf of St. Lawrence.

Several interesting varieties of *Plectambonites sericea*, Sowerby, also occur at this horizon and were collected. From a preliminary examination of the forms obtained on this and previous occasions, four distinct types may be said to occur.

First, the small normal Trenton form, with its regularly rounded anterior margin and very delicate, evenly and alternately striated surface and non-ornamented shell.

Second, a larger, conspicuously mucronate variety which usually presents a rugose area immediately below the hinge-line on the dorsal valve, the rugae are outwardly directed, and form a conspicuous character in many individuals obtained.

Third, a small globose or exceedingly tumid variety with strongly arcuate valves and very minutely striated, with occasional distant radiating lines from the beak to the anterior margin numbering from four to six in different individuals. (This variety bears considerable resemblance to *Leptæna quinquecostata*, McCoy, from the Ordovician of Ireland.)

Fourth, the largest form usually classed under this designation, is one measuring nearly three centimetres in length and more than one centimetre in height, with the anterior margin subparallel for the greater part to the hinge margin, thus forming an irregular parallelogram. This form is not infrequently met with in the shales of the Lorraine formation in the vicinity of Quebec, Montreal and Toronto, as well as of Ottawa.

Besides the above notes on a few of the species obtained on this occasion further studies will no doubt reveal additional information of a most interesting nature to the student of local geology.

The locality is not only prolific in fossils but readily accessible. More than twenty species have already been recorded from this horizon—the zone of Schizambon—and amongst these may be mentioned the *Cirripede*, described by Dr. Henry Woodward as *Turrilepas Canadensis*, a number of opercular valves of which were also obtained by the writer since the shipment of the original specimens to Dr. Woodward from which the species was described.

The lower measures of the Utica formation, which consist at this particular locality as well as at New Edinburgh and Roches-

terville of limestones and shales alternating with each other, rest perfectly conformably upon the uppermost measures of the Trenton formation. The writer desires to emphasize this statement in view of the oft-repeated assertion that throughout eastern Ontario and Quebec the Utica everywhere rests unconformably upon the Trenton formation. (See Trans. Roy. Soc. of Can., Vol. I, p. 258. 1883. Paper by T. Stery Hunt.)

Amongst the interesting collections made about Ottawa by local collectors during the past year may be mentioned one by Mr. W. H. Roger, of Billings's Bridge. Amongst the species recorded in the Roger collection from the Utica of Billings's Bridge there are two forms which prove to be hitherto unrecorded, whilst the remaining species, eminently characteristic of the Utica, are sufficiently numerous to enable one to state the precise horizon of the strata from which they were obtained. One of these is a gastropod—a *Lophospira* which bears a considerable resemblance to *L. conoidea*, Ulrich, but is more depressed and has a much larger apical angle, &c. I venture to suggest the name *Lophospira Billingsensis*, for this species awaiting an opportunity of illustrating it and describiug the same in a more complete form.

Normal School Collection of Local Fossils.—In order to stimulate local research in Palæontology and in a small measure to assist the educational world around us, the writer has undertaken to arrange and classify a number of the more typical and easily recognised fossils from the different geological horizons in the Ottawa Valley. These were presented to the Principal of the Normal School, and now occupy a portion of the flat show cases of the physics laboratory. The collection consists of about 150 specimens, which serve to illustrate nearly all the Palæozoic formations comprised in the Ottawa Valley. They include the following formations :

VIII. Niagara.

VII. Lorraine.

VI. Utica.

V. Trenton.

IV. Bird's-eye and Black River,

III. Chazy.

II. Calciferous.

I. Potsdam.

From the above list it will be seen that the red shales and marls of the Medina which occur to the east of Ottawa City, in the County of Russell, and which have been recently visited by the writer, are not included, inasmuch as no fossil organic remains have as yet been obtained from them.

The specimens are all labelled and named. The labels indicate the genera and species, together with the name of the author, as is customary, the geological formation, the precise locality from which they were obtained, besides the name of the collector and the date when they were obtained. A type-written list of the species included in this collection has been placed on the wall alongside the case. Any additions that may be made to this collection by members of the Club will be incorporated in this nucleus of a collection of the fossil remains of Ottawa and vicinity. It is earnestly hoped that members of the Geological section and others will contribute and co-operate in making the series as complete as possible. I would venture to suggest that this collection bear the name "Billings" collection of fossils," not only to do honour to one of Ottawa's greatest men in the list of the departed from this sphere of activity but in order to strive to associate with it the name of a true lover of Nature, and especially of fossil organic remains.

Graptolites.—From 1879 to 1888, whilst engaged in studying the fauna of the Utica about Ottawa, as leader in the Geological branch of our Club, the writer obtained not a few specimens of graptolites in the bituminous shales of this formation. Some of these, especially the *Leptograptidae* and a number of *Climacograpti*, were in an excellent state of preservation and have since been forwarded to Prof. Chas. Lapworth, of Mason Science College, by the authorities of the Geological Survey department at Ottawa, to whom they had been presented by the writer.

Prof. Lapworth has kindly undertaken to examine the same, and his report is now in the hands of the department. We hope to see the result of his examination of the species of Ottawa *Graptolites* published at no distant date.

Crinoidea, or Sea-Lilies.—From a communication recently received from Prof. F. A. Bather, of the British Museum, he informs the writer that he has almost completed his investigations and studies of the collection of Ottawa *Crinoidea* and *Cystoidea* sent by the writer some years ago to the authorities of the British Museum. This collection formed part of the Stewart collection, of which such fine and unusually well-preserved forms were purchased by the Geological Survey department and are now placed on exhibition in one of the Trenton cases in the Palæontological Section. Prof. Bather's notes on these Ottawa species will be looked forward to with much interest. As was pointed out some years ago by Mr. Walter R. Billings, the members of the Geological branch of the Club can do much in helping to further the interests of science and scientific research in our midst by communicating their specimens to specialists.

Pleistocene Geology.—In connection with the work of investigating the boulder-clay, marine sediments, such as the Leda clay and overlying Saxicava sands in the series of Pleistocene deposits, considerable progress has been made. Probably as an inducement to make additional collections and investigations in the marine clays of the Ottawa Valley, one of your leaders has been selected to represent this portion of Canada on the Committee of the British Association for the Advancement of Science "to investigate the fauna and flora of the Pleistocene of Canada, of which Sir Wm. Dawson is Chairman."

Bibliography.—The progress of Geological work in Canada during 1898, as recorded by the writer,* shows that upwards of seventy distinct reports, publications or pamphlets were published during the past year by Canadian geologists either in Canada, Great Britain or the United States.

It is earnestly hoped that during the coming season much work will be accomplished in this district.

All of which is respectfully submitted.

(Sgd.) H. M. AMI.

Leader.

March, 1899.

*OTTAWA NATURALIST, Vol. XIII, No. 2, pp. 52-55.

PROGRAMME OF WINTER SOIRÉES, 1899-1900.

- Nov. 28.—INAUGURAL ADDRESS AND CONVERSAZIONE, Assembly Hall, Normal School.
 Exhibition of Specimens in the various departments of the Club's work.
 Addresses by Dr. J. A. MacCabe, M.A., F.R.S.C., Principal of the Ottawa Normal School, and Professor Macoun, M.A., F.L.S.
 Microscopical Objects and Science, lantern slide illustrations.
 Nature Study in Schools, followed by lantern slide illustrations of minute structures in flowering plants, by S. B. Sinclair, M.A., and A. D. Campbell, B.A.
- Dec. 12.—“*Ottawa Diptera*,” by W. H. Harrington, F.R.S.C.
 “*Notes on Rearing Insects*,” by Dr. James Fletcher, F.L.S.
 “*Some Interesting Moths Taken at Ottawa*,” by Arthur Gibson, B.A.
 Report of the Entomological Branch of the O. F. N. C.
 Report of the Botanical Branch of the O. F. N. C.
- Jan. 9.—“*On the Comparative Anatomy of the Ear*,” by Prof. E. E. Prince, B.A., F.L.S., with lantern slide illustrations.
 “*Gannets and Cormorants, with special reference to Canadian forms*,” by Andrew Halkett, Esq., of the Marine Department.
 “*Notes on the Bridgewater Conglomerates*,” by Alfred E. Barlow, M.A., F.G.S.A.
 “*Principal Places of Geological Interest about Ottawa*,” by H. M. Ami, M.A., F.G.S.
 “*Notes on the Occurrence of Remopleurides in the Upper Trenton of Ottawa*,” by H. M. Ami, M.A., F.G.S.
 Reports of the Geological, Ornithological and Zoological Branches of the O. F. N. C.
- Jan 23.—“*Electric Currents of High Potential and High Frequency, with Roentgen Ray Experiments*,” by Ormond Higman, Esq., of the Electrical Staff of the Canadian Government.
- Feb. 6.—Conversazione and Microscopical Soirée in the Assembly Hall of the Normal School. Microscopical objects will be exhibited either on the screen or under microscopes, and a number of five-minute addresses will be delivered on the specimens exhibited.
- Feb. 20.—“*Labrador Peninsula*,” by A. P. Low, B.A.Sc., of the Geological Survey Department, with lantern slide illustrations.
- Mar. 6.—“*Sable Island*,” by Prof. John Macoun, M.A., F.L.S., with lantern slide illustrations.
 “*Traditional History of some of the Indian inhabitants of the vicinity of Lake DesChênes*,” by T. W. E. Sowter, Esq., of Aylmer, Que.
- Mar. 20.—Annual Meeting of the O. F. N. C. for the reception and adoption of Reports of Council, election of Officers, &c.
- N.B.—At each meeting various objects of Natural History will be exhibited and conversation and discussion expected. Any member is at liberty to introduce a paper or note on any Natural History subject in connection with the work of the Club at any of the evenings of the course.

TIME AND PLACES OF MEETINGS.

The Inaugural Address on Nov. 28th, 1899; the X Ray Lecture and Demonstration by Ormond Higman, Esq., Electrician, Jan. 23rd, 1900, and the Microscopical Soirée and Conversazione, Feb. 6th, 1900, by kind consent of Principal MacCabe, will be held in the Assembly Hall of the Normal School, and the remaining Soirées will be held in the Lecture Hall of the Y. M. C. A., O'Connor street. All the Soirées are held on Tuesdays at 8 p.m. sharp.

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No. 10

ARCHÆOLOGY OF LAKE DESCHÊNES.

BY T. W. EDWIN SOWTER.

To those who are unacquainted with local topography it may be said that Lake Deschênes is an expansion of the Ottawa River, extending from the Chats Falls, in a south-easterly direction, as far as Deschênes Rapids, a distance of about thirty miles, and averaging from less than one to upwards of three miles in width. This beautiful expanse of water was known to the old "voyageurs" as "Lac Chaudière," and was so designated at a time as comparatively recent as that in which the late John Egan was mayor of Aylmer, as there is an old by-law, bearing his signature, in the municipal archives, in which the westerly limit of the Aylmer Road is described as Chaudière Lake.

A similar confusion of place-names, in this connection, is a source of annoyance to the student of natural or ethnic history in dealing with matters of local reference. For instance: Chats Island is now known to many as Moore's Island; Pointe à la Bataille has become Lapottie's Point, and Pointe aux Pins, the site of the Queen's Park, is known to summer visitors as One-tree Point.

It seems a pity that names given to these places by the pioneers of civilization should be thus lightly set aside for the prosaic nomenclature of modern times.

As already noted in THE NATURALIST, the evidences of Indian occupation of the shores of Lake Deschênes are of frequent occurrence and of extreme interest to the archæologist. These consist, for the most part, of what may be termed beach workshops, or certain portions of the lake shore where the primitive workman

chipped out his flint arrowheads ; or labouriously ground an edge to his rude stone tomahawk, many years before the coming of the pale-faces.

At these places the beach is thickly strewn with flint chippings and, frequently, the sand or gravel contains large quantities of them to a considerable depth. This flint, which is very dark, is identical both in colour and character with that contained in the Trenton formation at Hull, from whence it was doubtless procured, as it is there found in large quantities and may be removed from the limestone beds with little difficulty. The fact that flint is not found in the Chazy or Calciferous rocks, outcropping on the lake front, would seem to justify the presumption that the Algonkin warriors of Lake Deschênes procured their supply of raw material from the nearest and most convenient source, which would be the place already indicated.

While these work places contain such traces of palæolithic art in great abundance, they also reveal evidences of later contact with the white man in the shape of light colored gun and musket flints which are said to be characteristic of the Cretaceous flint of western Europe.

At Bell's Bay, just below Aylmer, I removed several fragments of worked flint from beneath a large oak stump and about one foot below its base. These were taken from a bed of river gravel that was being washed away, at high water, by successive spring floods. Similar fragments were also obtained from the surface of the same gravel bed, having been laid bare by the washing away of the overlying deposit of vegetable mould. As, in the former instance, the flints must have become embedded in the gravel long before the time required for the oak to grow from a seedling to a large forest tree, it is not difficult to form an approximate estimate of the long period of time which must have intervened between the days in which the first and the last of these fragments were cast aside by the lithal artificer.

At Raymond's Point, on the side next the big bay, some recent quarrying operations have exposed a fine section of stratified rock, with an overlying bed of coarse gravel about 18 inches in thickness. I secured a piece of flint from the bottom of this gravel, where it came in contact with the bed of rock beneath. It

was evident that the gravel had not been disturbed by natural or artificial agencies since the clearing away of the forest, and, as the bed is beyond the reach of the high water in the spring, there is some ground for the supposition that it must have been washed into its present position at a time when the volume of water in Lake Deschênes was much greater than it has been in recent years.

From a personal examination of the foregoing and similar data, I am convinced that for many generations these work places were centres of aboriginal occupation, either as village sites or permanent camping grounds, for the red men of this part of the Ottawa valley.

These places, which have so far been examined, are situated at Raymond's Point, just opposite the innermost extremity of Chartrand's Island, and at Snake Island Point and Noël's Point, all on the Ontario shore. Also, from the eastern boundary of the Queen's Park at Pointe aux Pins, on the Quebec side of the lake, the shore is strewn with flints as far down as the rocky point which forms the eastern limit of Newman's Bay. At Bell's Bay, between the town of Aylmer and Deschênes village, at the mouth of a small creek, flints are also found in great abundance, and above and below it at frequent intervals.

A peculiar feature of these beach workshops is that the greatest accumulations of flint chippings are to be found about large boulders or detached masses of rock, which appear to have been utilized as work-tables upon which the chipping, pecking or grinding processes in the fabrication of implements of war or of the chase were accomplished by the ancient workmen.

Fragments of rude pottery, at Raymond's Point, composed of a mixture of clay and gravel, and imperfectly burnt, are indications that in fictile work the primitive dwellers on the shores of Lake Deschênes had mastered the initial stages in the manufacture of domestic utensils. These fragments are quite smooth and ornamented on the outside; while they are either smooth or bear the unmistakable impressions of grass blades on the inside; from which it would seem that two different methods were employed in the manufacture of the originals to which they belonged. In one process, the primitive potter seems to have daubed the matrix

about a core of grass, which was doubtless worked into the shape of the desired utensil. Then, by placing the whole mass in the fire the grass core would be burnt to ashes and a rude earthen vessel would remain as a triumph of aboriginal art. By the other method, some advance appears to have been made, as in this instance the matrix has evidently been manipulated both on the inside as well as the outside, which is evidence that the grassy core had been discarded by the adoption of a simpler process of manufacture.

Specimens of celts or palæolithic tomahawks, picked up at Bell's Bay and Raymond's Point, as well as others from neighboring localities, are very crude products of lithal workmanship. A fragment of stone appears to have been selected about the size and as near as possible the shape of the desired weapon. One end of this was then ground down to a cutting edge, and a celt from Raymond's Point has had one side reduced to proper shape by pecking. A peculiarity of many specimens from this district is, that the sharpened end of the blade has been ground flat on one side and broadly rounded on the other, something like the edge of a carpenter's axe.

The arrowheads, from these beach workshops, vary in shape, as they were doubtless designed for different purposes. They are usually made of flint and some of them of white quartz. The Squaw's Knife, Fig. 1, and the arrowheads, Figs. 3, 4, 5, 6 and 7 in Plate II., were collected by Mr. Jacob Smith of the Interior Department at Ottawa. They are now in the collection of Rev. A. W. Mackenzie of Lakefield, Ont., who kindly loaned them to illustrate this paper. Mr. Jacob Smith, of the Interior Department, picked up a small and very perfect one, at Snake Island Point, which was probably designed for the killing of birds or small animals. It was only about one half the usual size and was made of light grey agate. A single arrowhead, made of bone, was taken from an Indian grave on the Lighthouse Island, and is probably the only specimen of the kind from this district. It should be remembered, however, that weapons made of this material and exposed for many years to the action of the weather, as well as in many cases to the attrition of the shifting gravel of the lake beach, would soon be destroyed; so that the absence of

all but a single specimen should by no means be taken as negative evidence that bone arrow-tips were not in common use among the Indians of the lake.

As already stated, gun and musket flints have been found mingled with the flint chippings of these workshops. This is obviously an indication of the advent of the European trader. Of course these flints may have been lost or discarded by either white man or Indian; but their presence may also bear witness to these village sites having been used as temporary camping grounds by the "coureurs des bois," or, later on, by the agents of the Hudson's Bay Company. A silver bangle was also found, at Snake Island Point, which is said to resemble those which are still used in the ornamentation of hunting shirts and supplied to customers of the above named company in the North West Territories.

My attention was first directed to these workshops by Mr. Jacob Smith, of the Interior Department at Ottawa, to whom is due the sole credit of their discovery. Mr. Smith has thus rendered an important contribution to the advancement of science that will be duly appreciated by every student of Canadian archæology.

In a former paper in *THE NATURALIST* on the "Antiquities of Lake Deschênes," I called attention to the finding of a cache of bullets, some years ago, by Joseph Leclair of Aylmer, at Pointe à la Bataille, otherwise known as Lapottie's Point, at the junction of the lake shore with the eastern limit of Constance Bay. The bullets are said to have been large and suited for a 12-bore gun. Mr. Leclair took away several hundreds of them, but left many more washing about in the sand.

On the 24th of May, 1897, Aldos and David Pariseau discovered a cache of bullets at Flat Rock, near Wilson's Bluff, and just above the summer residence of Mr. A. H. Taylor, in the township of South March, Ontario. They were found in the sand, in a few inches of water quite close to the shore, and 800 were taken from the cache, together with an Indian pipe with the head of some animal moulded or carved on the bowl. Some of these bullets are now in my collection, and I am told that they are what are known as the "trade bullets" supplied to Indians of the Northwest by the Hudson's Bay Company. They are about the size used for a 16-bore gun.

Some time ago while Mr. Charles Breckenridge was plowing on his farm at the mouth of Breckenridge's Creek, on the Quebec shore of the lake, about eight miles above Aylmer, he unearthed a large cache of gun-flints. He also found in the vicinity a couple of stone celts and the copper handle of a kettle. The handle was of rolled sheet copper and belonged to a large sized kettle.

A very fine specimen of pipe-tomahawk was picked up by Mr. Samuel Edey on his farm on the N. $\frac{1}{2}$ of lot 19, 2nd concession of the township of South Hull. The axe weighs 1 lb. 1 $\frac{1}{4}$ ozs., and is one of the kind said to have been designed for presentation to Indian chiefs. The flint lock of a musket was also found at the same place, by Mr. Edey, but it was so badly rusted as to crumble to pieces on being touched. The point at which this find was made is about two miles from the lake shore to the north-east of Aylmer.

Some years ago, while a path was being cut through a gravel bank in front of the summer residence of the late Col. J. S. Dennis, at Kingsmere, Que., the workmen unearthed an iron tomahawk of French manufacture. An old squaw, who was living in the neighborhood at the time, informed Col. Dennis that according to a tradition of her people an Indian trail at one time led across the mountains, by way of Kingsmere, from the waters of the Gatineau River to those of Deschênes Lake.

This is by no means an unlikely story, for on the earliest recorded map of the township of Hull, several creeks of considerable size are shown as taking their rise at or near these mountains and flowing southward into the lake. Many of these tributary streams have shrunk in volume owing to the clearing away of the forest and subsequent drainage of the land for farming purposes; and some of the smaller ones have disappeared altogether. Traces along these watercourses of the dams of the much prized beaver, as well as the testimony of the early settlers that this district was at one time teeming with game, are sufficient reasons for supposing that these local tributaries of the Ottawa River were frequented by Indian hunters and trappers; and as one of the largest of these streams flows from the mountains, within a short distance of Kingsmere, this may have been the direction taken by the trail above mentioned.

Apart from the foregoing, it is not unlikely that when the primeval forest stretched in unbroken continuity between the waters of the Ottawa and the Gatineau, many a red inhabitant of the river front, in times of trouble, found an asylum on some of these streams and saved his hair from the covetous hands of unwelcome visitors, by availing himself of the strategic advantages of these intricate waterways in a practical application of the old Indian proverb that "water leaves no trail."

Although much important work has been accomplished in connection with the beach workshops already alluded to, there still remains a large amount of useful information to be derived from a careful examination of Indian burial places, at various points along the lake. One of these is said to be situated near Blueberry Point, a short distance above Bell's Bay; another may be found on what are known as the Sand Hills, between Bucham's and Constance Bays, on the Ontario side of the lake, near the mouth of Constance Creek; while a third is situated near the foot of the old Indian portage on Conroy's Island at the Chat's Falls.

A most important burial place, however, and the only one I have so far examined, is that of the Lighthouse Island above Aylmer and opposite the Queen's Park at Pointe aux Pins. At this place I have assisted at the exhumation of several skeletons, which has given me a fairly accurate insight into the mode of sepulture which obtained among the aboriginal people of Lake Deschênes.

This island, which is about an acre in extent, and rises at its highest point to some fifteen feet above the summer level of the lake, is composed of sand, gravel and boulders. It is of glacial origin and was obviously left in its present position by the recession of the vast glacier which at one time occupied this part of the Ottawa valley. Its area was at one time much greater than it is at present, but the upper side is being worn away by the ice shoves every spring and the subsequent high water.

There is abundant evidence to show that the island has been used as a burial place from very early times down to a period so comparatively recent as to come within the memory of those of the generation that is now passing away.

It is clearly evident that the interments are all intrusive, a

fact which would do away with the suggestion of a tumulus to account for the dome-shaped crown of the island where most of them are to be found. This is sufficiently shown, on the upper side of the island, where the cut bank in falling away has exposed sections of graves so clearly as to leave no room to doubt that they were excavated.

The usual mode of sepulture seems to have been to swathe the remains of the dead warrior in birch bark and place them, with or without his personal effects, in a shallow grave from two to three feet below the surface of the ground, in a recumbent rather than a prostrate posture. With one exception the burials are single, but in excavating the foundations of the lighthouse, recently erected by the Marine Department, at the highest point of the island, the workmen laid bare a great accumulation of bones, which would seem to indicate the presence of an ossuary, the approximate extent of which may be judged from the fact that a cartload of bones was removed from the holes for the base supports of the superstructure.

If, therefore, we may rely upon the testimony of the workmen who excavated the foundations of the lighthouse, and there is no reason why we should not do so, then, we have on this island two distinct modes of sepulture, the single and communal. This would lead to the conclusion that two different races, practising variant mortuary rites, were contemporaneous occupants of the lake shores, according to each other the privileges of a common burial place. The presence of the communal grave is accounted for, as a matter of course, by shadowy Indian traditions of a bloody native battle fought in the vicinity. A. F. Hunter, in dealing with a kindred subject, "The Rice Lake and Innisfil Mounds," says that "the same is true of every bone-pit or communal grave of any kind from Montreal to Detroit, none of which could be understood by the modern Algonkins as burials made in times of peace."

Now, in the first place, the bones on the Lighthouse Island have been thrown into the pit promiscuously, as they are not grouped in the relative positions which would naturally follow if they had been buried in the flesh. In the second place, if an invading force had been met and "wiped out" by the warriors of

the lake, it is altogether likely that, after the scalping-knife had done its work, the victors, instead of giving their slain enemies a decent burial, such as the above grave would indicate, would have left them, in conformity with Indian usage, to the wild beasts of the forest, while their own dead would have been interred at leisure in accordance with tribal custom.

As a suggestion, in explanation of the presence of this ossuary, may it not have been likely after the great Huron-Iroquois family quarrel that one of the remnants of the fugitive Huron nation may have found an asylum in this vicinity, have lived in friendly intercourse with the native population and held the "Feast of the Dead" on this island burial place. Iron tomahawks, scalping-knives, gun and musket flints, porcelain beads, &c., have been found on this island at different times. A stone slab bearing the letters J P O T was found by Mr. Boucher in what was probably the grave of a white man.

The most unique isolated burial, however, that has yet been discovered on the island, was that recently laid bare by the lighthouse keeper, Mr. Frank Boucher.

After the destruction of the old lighthouse, in the early part of last summer, and before the erection of the new structure by the Marine Department, while Mr. Boucher was sinking holes for the reception of a tripod to support a temporary light, he unearthed a skeleton together with a large array of implements. The skeleton was in a reclining position with the implements placed beneath the shoulders. Mr. Boucher very generously presented me with the skull, the bones of the pelvis and the implements. These latter consisted of an iron tomahawk, three knives, five gouge-like iron tools, some beaver teeth, a bone gouge, a bone skin-dresser, a bone harpoon and a bone netting needle, a copper kettle with an iron handle, a bar of wrought iron perforated near the middle, some pieces of sheet lead, a number of shell beads or disks, a flint for making fire, and a quantity of human hair made into fringe and wrapped in birch bark.

Sketches of this tomahawk and of the one found by Mr. Edey were sent for identification to Mr. David Boyle, curator of the Archæological Museum at Toronto. As Mr. Boyle is one of our most distinguished archæologists, and one who has had large

experience in the study of Indian relics, his own description of the weapon will be far clearer than any that might be substituted by me. He says :—

“The tomahawks of which you send drawings are undoubtedly French. We have many bearing a similar mark. The British ones usually have a round eye and are not nearly so well made as the French tools. They are also smaller and handier, according to Indian notions, for we have several examples of attempts, successful and otherwise, to make the French ones lighter by laboriously sawing off longitudinal sections with flints, just as if the tools had been made of stone.”

“The French stamps vary somewhat, and tools of British make have seldom any stamp at all. There is quite a little field for investigation respecting the makers and the stamps. I fancy that each trading company had its own mark, those from, say Rochelle being distinguishable thus, from those made in or coming from Havre or St. Malo. This, however, is only a surmise.”

The iron tomahawk from the Lighthouse Island is made with a slide eye, and is 2 lbs. and $1\frac{1}{4}$ ozs. in weight.

The three knives are all of the same pattern but of different sizes. As they are so badly rusted, it is impossible to find any marks on them by which they might be identified. One of them has a wooden handle, inlaid with a vine-like design in copper. One of them is strongly made, with a 6-inch blade, and was doubtless the one used in removing the emblems of victory from the heads of slain enemies, in other words, the scalping-knife.

The five gouge-like tools are of iron, and therefore of European make. It is difficult to say, however, for what purpose they were used, Mr. Boyle inclines to the belief that from the small bulb or knob, at the end of the handles, they may have been used by means of pushing directly in the hand, perhaps as skin-dressers or flesh-scrapers. The blades are all more or less curved, and vary in width at the ends. A tool somewhat similar to these was received at the Toronto museum, not long since, but it had a straight blade and was minus the knob at the end of the handle. It is just possible they may have been the crooked knives used by wood-workers ; but they are so badly rusted that this must be merely a conjecture.

The bone harpoon is six inches in length and a little more than half an inch in width. It has four barbs and an eye at the shank end, by which it was doubtless attached to the shaft.

The bone netting needle is about three and a-half inches in length by less than half an inch in width, with an eye in the middle.

The copper kettle, which is of European manufacture, is in a good state of preservation and still bears the marks of fire upon the bottom. The bottom has not been knocked in by the stroke of a tomahawk, so as to render it useless, as is the case with many specimens from western Ontario. It is about six inches across the top, and four inches in depth. The handle, however, is badly rusted and might be broken by careless handling.

The bone gouge and the skin dresser are made, the former from a human thigh bone and the latter from a human jawbone, from which we are constrained to form a very low estimate of the moral status of their owner, who thus appropriated portions of a fellow-creature's anatomy from which to fabricate his domestic implements.

The hair fringe is a specimen of intricate and beautiful workmanship, and a tangible example of the delicate manipulation of the aboriginal hair-dresser. In his archæological report, 1897-98, to the Minister of Education for Ontario, Mr. David Boyle, in reference to native textile work, has written: "Before very long we shall be unable to become possessed of such specimens, and an effort should be made at once to collect every available type-sample of woven work from the hands of our Indians." As this is a timely and valuable suggestion, I have been particularly careful in ascertaining the exact texture of this piece of hair work. The warp, into which the hair is woven, consists of three threads about the thickness of and somewhat resembling ordinary stout sewing cotton. Examined through a common magnifying glass, these threads appear to have been spun from the inner fur of some animal, such as the beaver, the otter, or the muskrat, or from fine human hair from the head of a child. As the loom in which the fringe was fabricated was not buried with him, and a description of it, therefor, being out of the question, let us suppose that the ancient weaver adopted for the purpose some contrivance of

the simplest and most primitive character. His hunting bow may have suggested the use of a piece of bent wood, which, being strung with the warp threads one above the other, the thin strands of hair which constituted the weft were manipulated in something like the following manner: One of these strands was taken and one end of it passed outward between the middle and upper warp threads, around the upper thread, forward and downward across it and the middle one, outward between the middle and lower threads, around the lower one, forward and upward across this and the middle one, again passed outward between the middle and upper threads, then around the upper one and outward again between it and the middle one, around behind the middle thread and forward between it and the lower one. The free ends of the strand, one on each side of the centre warp thread, were then united and drawn forward with one hand, while with the thumb and finger of the other both warp and weft were brought firmly together. Succeeding strands having been treated in a similar manner and connected with each other by a lateral or side-long pressure, the result was a section of hair fringe with a selvage of about $\frac{1}{8}$ of an inch in width. Figure 10a in Plate II, represents a 3-ply strand of twine woven loosely through a warp of three threads, to illustrate the weaving of the hair fringe in Fig. 10.

The shell beads or discs are a little over $\frac{3}{8}$ of an inch in diameter, and appear to have been made from the shells of the *Unio*.

In looking over the bones belonging to the same skeleton, which Mr. Boucher had collected for the purpose of re-interring them, Dr. R. W. Neill, of Aylmer, now of Balmoral, Manitoba, picked out a segment of the lumbar vertebræ of an Indian that was transfixcd by a bone arrowhead. Dr. Neill very generously presented this interesting relic to me, thereby furnishing us with a striking example of the deadly nature of this aboriginal weapon, and a graphic illustration of the manner in which the deceased warrior met his death. This bone belonged to the Indian unearthed by Mr. Frank Boucher on the Lighthouse Island. The shank of the arrowhead, which had pierced the spinal cord from behind, is broken off, doubtless by the falling of the body, the

lower portion of which would become immediately paralyzed as a matter of course ; so that this victim of inter-tribal warfare in all probability passed to his happy hunting grounds with the war-whoop still ringing in his ears and his scalping tuft in the hands of a triumphant enemy.

It is indeed a gruesome relic and carries the mind back to a time in the history of New France when the line of communication, by the way of St. Lawrence, between the Indians of the great lakes and the lower French settlements had been severed by the blood-stained tomahawk of the Iroquois, and the northern and western tribes were beset at the carrying places and vulnerable points on the "River of the Ottawas" by the implacable hostility of their southern neighbours.

I might say in conclusion, that as we have in the membership of the Field Naturalists' Club some of the most eminent scientific men in America, it would be well if some of these would devote some of their leisure time to the study of Canadian archæology. We have in the vicinity of Ottawa a splendid field of investigation and I trust that the study of ethnic history, in this domain, will reflect honour upon the members of the Field Naturalists' Club.

ILLUSTRATIONS.

PLATE I.

Figure 1.—Pipe-tomahawk, $\frac{1}{3}$ diameter, from Mr. S. H. Edey's farm, N. $\frac{1}{2}$ of lot 19, 2nd concession of the township of South Hull.

Figure 2.—Tomahawk, $\frac{1}{3}$ diameter, from Indian grave on Lighthouse Island, near Aylmer.

Figure 2a.—French stamp, natural size on Fig. 2.

Figure 3.—Stone celt, $\frac{1}{3}$ diameter, from Bell's Bay, Lake Deschênes.

Figure 4.—Segment of lumbar vertebrae of Indian, natural size, pierced by bone arrowhead, from Lighthouse Island, near Aylmer.

Figure 4a.—Flat side of bone arrowhead in Fig. 4.

Figure 5.—Bone netting needle, $\frac{1}{2}$ diameter, from Indian grave on Lighthouse Island.

Figure 6.—Shell bead, from Indian grave on Lighthouse Island.

Figure 7.—Silver bangle, Snake Island Point, Lake Deschênes.

Figure 8.—Bone harpoon, $\frac{1}{2}$ diameter, from Indian grave on Lighthouse Island.

PLATE II.

- Figure 1.*—Squaw's knife of dark flint, $\frac{1}{2}$ diameter, from Lake Deschênes.
Figures 3-7.—Flint arrowheads, $\frac{1}{2}$ diameter, from Lake Deschênes.
Figure 8.—Skin scraper, made from human jawbone, $\frac{1}{3}$ diameter, from Indian grave, Lighthouse Island.
Figure 9.—Gouge made from human thigh bone, $\frac{1}{3}$ diameter, from Indian grave on Lighthouse Island.
Figure 10.—Hair fringe, natural size, but hair $\frac{1}{2}$ the natural length, from Indian grave, on Lighthouse Island.
Figure 10a.—Twine woven loosely to show method of weaving hair fringe in figure 10.
Figure 11.—Copper Kettle, $\frac{1}{3}$ diameter, from Indian grave on Lighthouse Island.
Figures 12-14.—Knives of European make, $\frac{1}{3}$ diameter, from Indian grave on Lighthouse Island.

PLATE III.

- Figures 1-5.*—Front view of gouge-like implements or crooked knives, $\frac{1}{2}$ diameter, from Indian grave on Lighthouse Island.
Figures 1a-5a.—Side view of figures 1 to 5.
Figures 6-7.—Gun flints, natural size, from Lighthouse Island, Lake Deschênes.
Figure 8.—Stone slab, $\frac{1}{10}$ diameter, lettered J.P.O.T., from grave on Lighthouse Island.

ON SOME TRENTON (ORDOVICIAN) FOSSILS FROM
THE LIGHT GRAY LIMESTONES OF CUMBERLAND,
COUNTY OF RUSSELL, ONTARIO, CANADA.

BY H. M. AMI, M. A., F., G. S.

Some weeks ago I received from my friend, Dr. F. Slater Jackson, of the Biological Laboratories, McGill University, a small but interesting collection of fossil organic remains made by him in 1890, at Cumberland, some 24 miles below Ottawa City.

They proved on examination to be eminently characteristic forms of the Trenton formation in the Ordovician System. This collection enables the writer to complete more perfectly the succession of life-zones in the Ordovician of that locality.

On the occasion of the Ottawa Field-Naturalists' Club excursion to Cumberland on the 15th of July, 1899, the Calciferous, Chazy, Black River and Trenton formations—the latter only very

imperfectly—were examined and recognised as forming a regular succession of well-nigh horizontal strata which appear along the Ottawa River front and form a more or less conspicuous series of cliffs and planes in ascending order until the summit of the highland is reached south of Cumberland, where the Trenton formation and the overlying Pleistocene deposits make their appearance. This locality is evidently a most interesting one inasmuch as it gives the geologist and collector an uninterrupted succession of fossiliferous sedimentary strata from the Calcareous to the Trenton at least, without the presence of the faults and folds or dislocations so prevalent in the immediate vicinity of Ottawa, which tend to obscure and puzzle the student of geology.

The following list of species of organic remains collected by Dr. F. S. Jackson in the light-gray, semi-crystalline limestone of Cumberland in 1890, as determined by the writer, are presented in the hope that they may serve to stimulate some of the local collectors to visit that interesting locality where our Ordovician formations are so well seen and developed.

ZOOPHYTA.

1. *Streptelasma corniculum*, Hall or allied form.

ECHINODERMATA.

2. Crinoidal fragments, not determinable.

BRYOZOA.

3. Branching form, requires a micro-section before it can be identified with certainty.

BRACHIOPODA.

4. *Plectambonites sericea*, Sowerby, typical form.
5. *Strophomena fluctuosa*, Billings.
6. *Rafinesquina alternata*, Conrad (Emmons).
7. *Strophomena*, cf. *S. tenuistriata*, Sowerby.
8. *Platystrophia biforata*, var. *lynx*, Eichwald.
9. *Rhyncheoma inæquivalvis*, Castelnau.
10. *Zygospira recurvirostra*, Hall.

GASTROPODA.

11. *Liospira Progne*, Billings.
12. *Trochonema umbilicatum*, Hall.
13. *Hormotoma gracilis*, Hall.
14. (?) *Omospira Alexandra*, Billings.

TRILOBITA.

15. *Asaphus*, sp. fragments of what appear to represent *Asaphus platycephalus*, Stokes.

16. *Calymene senaria*, Conrad; a fine pygidium.

17. (?) *Lichas*, sp. cf. *L. Trentonensis*, H.

Of the above, *Strophomena fluctuosa*, Billings, and the form referred to (?) *Omospira Alexandra*, Billings, are of special interest, the former species having been founded on specimens occurring in the Trenton limestones of Ottawa City, and the latter from the limestones of Paquette's Rapids, Ottawa River, below Pembroke. With the generous consent of Dr. Jackson, this collection of Trenton fossils will be presented to the local collection at the Normal School, where it is now deposited.

Ottawa, Nov. 24th, 1899.

 PALÆONTOLOGICAL NOTES.

In Doctor G. F. Matthew's "Studies on Cambrian faunas," Nos. 3 and 4 and "The Etcheminian fauna of Smith Sound, Newfoundland," just issued by the Royal Society of Canada, Trans. vol. v, section 4, series 2, 1899-1900. (1899), the following new genera and species of Canadian fossil organic remains are described :

I.—*Upper Cambrian fossils from Mount Stephen, Field, B.C.*
(From the cabinets of Mr. Byron E. Walker, F.G.S., Toronto, Ont.)

ANNELIDA (= Pteropoda of other writers.)

UROTHECA, (n. gen.) Matthew, 1899.

U. flagellum, Matthew.

U. parva, Matthew.

BYRONIA, (n. gen.) Matthew, 1899.

B. annulata, Matthew.

Orthotheca corrugata, Matthew.

Hyalithes carinatus, Matthew.

TRILOBITA.

Agnostus montis, (emend.) Matthew.

Corynexochus Roemingeri, Matthew.

Dolichometopus occidentalis, Matthew.

Bathyriscus pupa, Matthew.

NEOLENUS, (n. gen.) Matthew, 1899.

N. granulatus, Matthew.

Oryctocephalus Walkeri, Matthew.

Besides the above, Dr. Matthew also records the occurrence at Mt. Stephen, of the following forms from the Walker collection :

ANNELIDA.

Hyolithes, sp.

TRILOBITA.

Ptychoparia cordilleræ, Rominger.

Bathyriscus Howelli, Walcott.

Neolenus serratus, Rominger, sp.

Doropyge Darwini, Walcott, sp.

Zacanthoides spinosus, Walcott.

Ogygia (Ogygopsis) Klotzi, Rominger.

Dr. Matthew then gives a very careful analysis of the genera obtained from the Mt. Stephen horizon, and the percentage of their occurrence, with the use of comparative tables. He concludes by making the following statement : “ *The Mount Stephen Fauna is essentially Upper Cambrian.* ” This places the horizon of the Mount Stephen trilobite bed (at an altitude of between eight and nine thousand feet above sea-level) a higher position than had previously been assigned to it.

II.—*Studies on Cambrian Faunas, No. 4—Fragments of the Cambrian Faunas of Newfoundland.*

In this paper Dr. Matthew discusses the succession of faunas in Newfoundland, and combats the “ conclusion so universally adopted ” that the Olenellus zone occurs below the Paradoxides zone. He reverts to the arrangement of the succession of strata of E. Billings in 1864. In this connection Dr. Matthew writes : “ The impossibility of finding the genus Olenellus or its accompanying fauna in the strata of the Eastern Provinces of Canada, below Paradoxides (which strata were eventually found to contain a considerable fauna of trilobites) led him in 1892 to propound the view that Olenellus might be contemporaneous with Paradoxides but confined to a different habitat. This surmise was, in a sense,

confirmed by the finding of the fauna *accompanying* *Olenellus*, though not that genus itself, in company with the highest sub-zone of *Paradoxides* at Hastings Cove near St. John, in 1896."

The following fossil organic remains are described and recorded by Dr. Matthew in the text.*

LIST OF NEWFOUNDLAND FOSSILS DESCRIBED AND NOTED.

SPECIES,	LOCALITY.	HORIZON.
<i>Obolella Atlantica</i> , Walcott.	Foster's (Smith's) Pt, Smith Sound, Nfld.	Lower part of the Protolenus Zone.
<i>Raphistoma</i> (?) <i>Kelliensis</i> , Matthew.	Kelly's I., Conception Bay, Nfld.	Upper Cambrian, (Howley & Walcott)
<i>Arenicolites antiquatus</i> , Billings.	Great Bell I., Conception Bay. Nfld.	do
<i>Arenicolites brevis</i> , Matthew	do	do
<i>Ctenichnites ingens</i> (?) Matthew.	do	do
<i>Hyalolithes Hathewayi</i> , Matthew.		
<i>Microdiscus bellimucronatus</i> Shaler & Foerste, mut, <i>insularis</i> , n. mut.	Manuel's Brook.	Protolenus Zone.
<i>Agraulos</i> (<i>Strenuella</i>) <i>strenua</i> , Billings, mut. <i>robusta</i> n. mut.	Red limestones of Brigus; calcareous shales of Manuel's Brook.	do
<i>Strenuella</i> (?) <i>Attleboroensis</i> , Shaler & Foerste.	Manuel's, Bonception Bay, Nfld.	do
Mut. <i>vigilans</i> , n. mut.	Manuel's, Conception Bay.	do
<i>Micmacca Walcottii</i> , Matthew	" shale No. 3, Conception Bay.	Above basal conglomerate, Protolenus Zone.
" <i>Angimargo</i> , Matthew.	do	do
<i>Avalonia plana</i> , Matthew.	do	do
<i>Protolenus Howleyi</i> , Walcott sp. (?) non P. Harveyi	Foster's Point, Smith's Sound.	Lower part of Protolenus Zone.
<i>Metadoxides magnificus</i> , Matthew.	Manuel's Station, Conception Bay, Nfld.	do
<i>Atops trilineatus</i> , Emmons.	Manuel's Brook (??)	Subzone of <i>Paradoxides</i> bed(?)
<i>Erinnys breviceps</i> , Angelin.	Manuel's Brook.	" <i>Paradoxides Davidis</i> sub-fauna.

* Italicized names being those new to science and just published (*loc. cit. supra*.)

III. *The Etcheminian Fauna of Smith Sound, Newfoundland.* By Dr. G. F. Matthew.

The fossils described under this head "are from the Upper Limestone of the Etcheminian series at Smith, Sound an inlet of

Trinity Bay, Newfoundland (one is from the shale immediately below the limestone), and were collected in the summer of 1898." They include the following forms :

BRACHIOPODA.

Obolella, cf. *O. chromatica*, Billings.

Kutorgina granulata, Matthew.

GASTEROPODA.

Scenella, cf. *S. reticulata*, Billings.

" cf. *retusa*, Ford.

Randomia Auroræ, Matthew.

Parmophorella (?) *paupera*, Billings, sp.

Platyeeras transversum, Matthew.

" *radiatum*, Matthew.

" *cymbula*, Matthew.

LAMELLIBRANCHIATA.

Modiolopsis thecoides, Matthew.

ANNELIDA.

Urotheca pervetus, Matthew.

Helenia granulata, Matthew.

Hyalithellus micans, Billings.

(?) *flexuosus*, Matthew.

Coleoides typicalis, Walcott.

Orthotheca pugio, Matthew.

" *sica*, Matthew.

" *stiletto*, Matthew.

" *bayonet*, Matthew.

Hyalithes excellens, Billings.

" *rugosus*, Matthew.

CRUSTACEA.

Aptychopsis terranovicus, Matthew.

" " *mut. arcuata*,

These three papers are published in consecutive order in the Trans. of the Royal Society of Canada and form pp. 39—119 of Vol. V, second series, and contain eight plates of illustration of species described in the text. They form one of the most important additions made to our knowledge of the oldest fossils.—H. M. A.

In the Geological Magazine, Vol. 6, No. 8, August, 1899, pp. 358-361, Mr. F. R. Cowper Reed of the Woodwardian Museum, describes "*A New Trilobite from Mount Stephen, Field, B.C.*" A new species of *Oryctocephalus*, *O. Reynoldsi*, is the name given by Mr. Reed from the calcareous shales of Mount Stephen—the trilobite bed—referred to the Upper Cambrian by Dr. Matthew and the Middle Cambrian by Dr. Walcott.—H. M. A.

REPORT OF THE ENTOMOLOGICAL BRANCH, 1899.

(Presented at meeting held December 12th, 1899.)

The Leaders of the Entomological Branch are pleased to report that there has been a marked increase in the work done by this Branch during the year. A welcome addition to its ranks is Mr. Arthur Gibson, a new assistant in the Entomological Division of the Central Experimental Farm.

Considerable additions have been made to local lists, particularly of Nocturnal Lepidoptera, which have been specially collected and bred by Messrs. Fletcher, Gibson, Young and Henry Saunders. Some of the more interesting species of moths and caterpillars are shown here to-night, and will we trust be of interest to the members of the club, and an inducement to some to join the Branch and help in this interesting and useful work.

The publication of Dr. Holland's exquisite Butterfly Book is a notable addition to the literature of entomology, and provides the beginner with a most valuable aid to his studies of our most attractive insects. This beautiful work will enable anyone who wishes to study our butterflies to easily identify any species he is likely to capture in the district.

Those who may desire to study practical entomology have many aids available in the various official reports and publications issued by the several Governments in Canada, as well as by the U. S. Department of Agriculture and the numerous State Experiment Stations.

Many additions have been made to the public collections of insects at the Central Experimental Farm and the Geological Survey, as well as to the private collections of the Leaders, all of which are freely accessible to any person wishing to examine them.

LEPIDOPTERA.—Good work has been done in this order, in breeding from the egg or from larvæ collected in the field, as well as in collecting at electric lights. Some nice specimens of *Scopelosoma* were bred from eggs collected in Montreal, and sent to Dr. Fletcher, by Mr. Dwight Brainerd of that city, of these the perfect insects of *Scopelosoma tristigmata* and *S. morrisoni* as well as one of *S. sidus* taken at the Mer Bleue, are shown here to-night. *Erebia epipsodea* was reared to maturity from eggs received by post from Banff, in the Rocky Mountains, and collected by Mr. N. B. Sanson. Mr. C. H. Young bred a large number of the beautiful Io moth, *Hyperchiria Io*, from eggs laid by a captured female taken in the month of August. A large proportion of the moths emerged last autumn, which is rather unusual. Others remained in the cocoons and will not emerge until next spring.

Among the specimens of moths shown this evening are two, *Smerinthus modestus* and *Brephos infans*, which are interesting for the reason that although reared from the egg with several others, these two specimens instead of emerging at the usual time, in the spring following pupation, remained in the pupal condition for a whole year longer and the perfect insects only appeared last spring.

The Leaders wish to call special attention to a remarkably beautiful collection of inflated caterpillars collected at Ottawa and prepared by Mr. C. H. Young. There are in this collection over 100 specimens which will serve to show the value of this method of preserving for study and exhibition a stage in the development of *Lepidoptera* which has been very much neglected by entomologists.

Of the injurious species of this order, special mention must be made of the serious attacks of the American and Forest Tent Caterpillars, which devastated forests and orchards in many places in the district, but not in exactly the same areas as in previous years. Late in the season serious injury was wrought in turnip fields and on cabbages of many varieties by the small, active caterpillars of the Diamond-backed Moth, (*Plutella cruciferarum*). The parasites which usually accompany a serious outbreak of this insect *Limneria parva* and *Phaogenes discus* were found, but not in the large numbers ordinarily occurring. Late in the season much

damage was observed upon forest trees of various kinds by the caterpillars of a small moth, not yet identified, which webbed the leaves together and consumed much of their substance. Maples and beeches were the trees most attacked.

DIPTERA.—A subject which has been of considerable interest to the Leaders is an injury to new bricks, previous to burning, brought to their notice by Mr. Walter S. Odell. The larvæ causing the injury travel up from the ground and burrow in the surface of the soft bricks, thus disfiguring them very much. On two or three previous occasions larvæ have been submitted by Mr. Odell, but it was not until the present season that the perfect insect was reared. Dr. Howard, of Washington, to whom a specimen was sent for determination, reports the species to be *Pachyrhina sodalis*, Loew. This is one of the Tipulidæ, or Crane-flies, the larvæ of which are known by agriculturists as Leather-jackets, many of which are extremely injurious to growing crops. The injuries of the above-mentioned species have been noticed in the brickyards both in autumn and spring, showing that this curious habit is manifested not merely at the time when the larvæ are seeking suitable places for pupation.

Among injurious flies one of the notable attacks of the past season has been that of root-maggots (Anthomyidæ) to all cruciferous crops. Another species of the same family has been troublesome this year by its attacks upon the young shoots of various species of cultivated *Dianthus*, and also of the elegant garden plant *Gypsophila paniculata*. This last attack has been observed for some years, but was first noticed this season by Mrs. M. J. Whelan, by whom specimens were sent to the Leaders.

A preliminary list of Ottawa Diptera and some notes upon these insects will be presented by Mr. Harrington this evening, illustrated by specimens of many of the species.

HEMIPTERA.—In this order some investigations have been made upon the local species of Scale-insects and Plant-lice. The most remarkable occurrence of these insects has been a severe attack upon Elm-trees, during the month of August, by a species of plant-louse, which appeared so abundantly upon shade-trees as to render sitting or walking beneath them exceedingly unpleasant.

by reason of the copious showers of honey-dew which were ejected. Sidewalks and seats beneath such trees were made both unsightly and disgusting. Later, the trees themselves took on a dirty black appearance from the copious growth of the fungus *Fumago salicina*, which always develops under similar conditions.

Another attack which requires mention was by a large and previously undescribed Aphid, the Destructive Pea-louse, which not only did considerable harm to Sweet Peas in Gardens at Ottawa, but was a most serious pest to crops of Field Peas in many parts of the Dominion as well as in the United States. This insect has been named *Nectarophora destructor* by Prof. Johnson of College Park, Md. Several species of its enemies were collected in the field or bred from Ottawa individuals. Among these the following have been identified: *Praon cerasaphis*, *Aphidius Fletcheri*, Ashmead (N. sp.); *Syrphus ribesii*, *Coccinella 9-notata*, and *C. transversoguttata*.

In conclusion, the Leaders again invite all interested in the study of insects to make the fullest use of them during the season 1900, whether they should be re-appointed as Leaders or not.

W. H. HARRINGTON, }
JAMES FLETCHER, } *Leaders.*

REVIEWS.

REPORT ON THE GEOLOGY AND NATURAL RESOURCES OF THE AREA INCLUDED BY THE NIPISSING AND TEMISCAMING MAP SHEETS, COMPRISING PORTIONS OF THE DISTRICT OF NIPISSING, ONTARIO, AND OF THE COUNTY OF PONTIAC, QUEBEC. By Alfred Ernest Barlow, M.A. Geological Survey of Canada, Pt. I, Annual Report, Vol. X, 1899, p. 302.

This report, accompanied by two well executed maps on a scale of four miles to the inch and covering an area of 6912 square miles of the northern protaxis of the Dominion of Canada, is a valuable addition to the literature of the pre-Cambrian of North America, and is a further instalment of the work which is being systematically carried forward by the Dominion Geological Survey

on these older rocks. The two maps, constituting what are known as sheets Nos. 131 and 138 of the Canadian Series, lie in the Upper Ottawa district along the border of the two provinces of Quebec and Ontario, and comprise portions of both. Lake Nipissing and Lakes Temagami, Temiscaming and Keepawa, as well as many smaller bodies of water, are included in the area, and afford along their shores especially good opportunities for the prosecution of geological work.

After presenting a general account of the early explorations in this region, some of which date back almost to the time of the earliest settlement of the country by the French, and of previous surveys, the physical features of the country are described. The area is a great uneven or gently undulating rocky plateau, sloping somewhat to the east and northeast, having a general elevation of of 900 to 1200 feet above sea-level, the level being so nearly uniform that hills 50 to 100 feet higher are conspicuous topographical features. This peneplain is traversed in a north and south direction along one line of a very deep and rocky gorge, in which lie Lake Temiscaming and the Ottawa River. The hills, or cliffs, rise to a height of 400 to 600 feet from the water on either side, while the water of the lake is 400 feet deep, the bottom of the gorge being filled with a fine silt. The depression is thus 1000 feet deep and represents a great canon similar to those which are found on the margin of the northern protaxis at so many other points. Several smaller rivers also occupy similar depressions. "The detailed examination of the region, however, amply demonstrates that the sculpturing to which the surface owes its present configuration was practically completed long before the advent of the glacial epoch, and that the main valleys, especially those of the Ottawa and Mattawa rivers, were in existence long prior to the deposition of the Palæozoic sediments." With the exception of some comparatively small areas occupied by Palæozoic outliers, ranging in age from Black River to Niagara, the district is underlain by rocks of Laurentian and Huronian age. The Laurentian, with the exception of a few small occurrences, is represented exclusively by the Fundamental Gneiss, a mass of granitic and dioritic rocks, usually possessing a foliated structure in which are many streaks, bands or inclusions of basic character, allied to

diorites or diabases in composition and representing either basic segregations from the granitic magma or portions of basic intrusions caught up in it. This Fundamental Gneiss, it is believed, probably represents the original crust of the earth which has undergone successive fusions and re-cementations before reaching its present condition. In placing these rocks at the base of the series it is not intended to assert that they stand for any distinct or prolonged period of geological time, nor to affirm that these rocks in their present condition and with the foliation which they now possess antedate those of the Huronian system. This, as is shown, is not the case in many, or even probably in most, instances.

The chemical and mineralogical composition of the gneisses, as well as the character and origin of their foliation and the genetic relation of their associated pegmatites, are considered at length and many interesting facts brought forward which cannot here be further discussed.

The Grenville Series, so extensively developed further south, in this northern area is represented only by a very small and unimportant occurrences of highly crystalline limestone and a single occurrence of gneiss. They occur isolated from one another and surrounded by Fundamental Gneiss on every side, and are referred to the Grenville Series on account of their identity in petrographical character with the areas of this formation immediately to the south.

The district also includes large tracts of country underlain by pyroclastic and epiclastic rocks, forming a northeasterly extension of the development of the "typical" Huronian area on the north shore of Lake Huron. At one place on Lake Temiscaming, these Huronian rocks are found resting upon the floor of Fundamental Gneiss on which they were originally deposited, and of whose detritus they are made up; everywhere else the Fundamental Gneiss has been re-fused or softened and penetrates the superincumbent Huronian. The total thickness of the Huronian in the area is about eighteen hundred feet, made up as follows: 1. Breccia Conglomerate, 600 feet. 2. Shales and slaty greywackes, 100 feet. 3. Quartzose grit or Arkose, 1100 feet. Associated with these Huronian sediments are numerous intrusions of

gabbro and diabase, some of which pass over gradually into flesh-red granites, representing, it is believed, portions of one and the same magma.

No attempt is made in this report to correlate the Grenville Series and the Huronian of the area, as the facts are insufficient to warrant the attempt. And it may be remarked incidentally in this connection that a statement made on page 415 of the current volume of the *Journal of Geology*, in reviewing some other recent papers on the Canadian pre-Cambrian, is scarcely correct. The statement is as follows :

“The succession and correlation proposed in the above papers by Adams and Barlow and by Ells are fundamentally different from the traditional one which has been held in Canada for many years. The first departure is in placing the Grenville and Hastings Series as equivalent to the Huronian.”

In the papers in question this correlation was not definitely made, but it was stated in reference to the Hastings Series that “Both lithologically and stratigraphically the rocks bear a striking resemblance to the rocks mapped as Huronian in the region to the north and northeast of Lake Huron, and it seems very likely that the identity of the two series may eventually be established. The two areas, however, are rather widely separated geographically and the greatest care will have to be exercised in attempting such a correlation.”*

The further statement made by the Reviewer that “Ells places with the Huronian all the sedimentary rocks of Eastern Canada” is also manifestly inaccurate, seeing that while it might terminate the controversy concerning the upward extension of the Huronian to include in that system the whole Palæozoic succession, Ells certainly did not advocate this course.

The Palæozoic outliers in this area, and especially that of the Niagara age, are of exceptional interest. Geographically this outlying patch of Niagara is so widely separated from any other locality where rocks of this age are known to exist, that it has been a question as to whether it was formerly connected with the occurrences about Hudson Bay or with those about Lake Ontario.

*American Journal of Science, Vol. III, March, 1897, p. 177.

The strata are highly fossiliferous and the palæontological evidence presented seems to prove that the seas in which the Niagara sediments of the Winnipeg basin and of Hudson Bay were deposited were practically continuous, while both were separated from the Temiscaming basin and the region to the south west.

The Pleistocene history of the region seems to consist of a period of glaciation by a great ice sheet followed by profound submergence, during which time the ocean invaded a large portion of the Ottawa Valley forming a marine gulf rivalling in extent the similar invasions of the sea in Palæozoic times. The direction of motion of the ice varies from S. 7° W. to S. 18° W.

The report also contains much information concerning the fauna, flora and timber resources of the district, and has appendixes giving lists of elevations and catalogues of the Palæozoic fossils.

F. D. ADAMS.

CANADIAN GEOLOGICAL NOMENCLATURE. By Dr. R. W. Ells. Trans. Roy. Soc. Can., Vol. V, 2nd Ser., Sec. IV, pp. 3—38.

In this important contribution to the Science of Geology, Dr. Ells, as president of Section IV of the Royal Society of Canada, discusses the problems still existing in Canadian geology, the new names added to the geological nomenclature of Canada, the history and development of the present classification employed in this country, followed by a discussion of the nomenclature in "the Great Archæan Complex with its vast series of overlying palæozoic sediments reaching upward in the geological scale to the Triassic formations" included in that portion of Canada, east of the Red River of Manitoba. Dr. Ells indicates clearly the various terms used in Nova Scotia and New Brunswick as well as in Ontario and Quebec.

It may not be deemed out of place here however to point out that, for instance, such names as "Dadoxylon sandstone," "Cordaile shales" and "Mispec group," as applied to the Devonian formations, are not, in the strict acceptance of the word, for-

mational names, but indicate rather, in two cases at least, a biological zone, a life-zone. The term "Perry sandstone" is also referred to (p. 14), and as is the case also of similar nomenclature in the gold-bearing series of Nova Scotia, no true formational names are assigned. For such names as the "Perry sandstones" the "Perry formation" could be easily adopted; for "Mispic group" the term "Mispic formation" employed, whilst substitutes are decidedly necessary for such expressions as "Dadoxylon sandstone," "Cordaite shales," etc., which refer to biological characters rather than stand as names of a definite formation. Dr. Ells has given us in this interesting address the nomenclature used up to recent years. It is manifestly high time, especially in Eastern Canada, that some new and more modern classification be adopted. Formational names ought to be given to the slate and quartzite series in the gold-bearing series of Nova Scotia. If areas exist which can be mapped out over extensive tracts, why not adopt some name which will be applied for instance, one to the lower and another name for the upper division of the gold-bearing rocks of Nova Scotia. The last statement refers more particularly to the nomenclature used in the excellent reports and on the maps of Mr. E. R. Faribault, where the names "slate series" and "quartzite series" are employed as formational names but are names merely based on a description of their lithological characters. Dr. Ells's paper is full of suggestions, and deserves careful perusal.

H. M. A.

SOIRÉES.

The first soirée in the winter course was held in the assembly hall of the Normal School, November 28th, when Prof. John Macoun occupied the chair. Dr. MacCabe principal of the Normal School, in a brief and forcible address bade the club welcome. He spoke of the educational work done by the club and emphasized the necessity of field work in the study of nature. Dr. H. M. Ami, the president of the club, then delivered his inaugural address, speaking of the work accomplished by the late E. Billings, who by his energy and patient research did so much for palæon-

tology in Canada. The president then referred to the necessity of erecting some suitable tablet or memorial in Ottawa to his memory, as it was here that much of his best work was done. Reference was also made to the death of Sir J. W. Dawson. Appended to the biographical sketches of E. Billings and Sir Wm. Dawson were lists of the writings of each of these two Canadian palæontologists and geologists. Sir James Grant also referred to the work done by the late E. Billings, with whom he had been associated in his geological rambles in and about Ottawa, and hoped that a suitable memorial would be erected to commemorate his life-work.

Mr. S. B. Sinclair then gave an interesting address on nature study and modern methods in scientific research.

A short intermission was then given during which the audience examined the various interesting objects on exhibition. Microscopes under the management of Messrs. Odell, Halkett, Attwood and others, were well patronized. Among the exhibits that were much appreciated was a fine collection of recent shells, shown by Mr. Thomas Whitley, also four cases of Ontario butterflies and moths from the private collection of Mr. Arthur Gibson of the Central Experimental Farm. Mr. R. B. Whyte showed an excellent photograph of *Cypripedium pubescens*. Prof. E. E. Prince exhibited the head of the great Lake Trout, and Dr. H. M. Ami showed photographs of geological phenomena about Ottawa, fossils from the Utica and pleistocene of Ottawa, and human remains from Lighthouse Island, Aylmer, collected in 1899. Messrs. S. B. Sinclair, and D. A. Campbell then gave an exhibition of lantern views showing the Minute Structure in Flowering Plants. Mr. Campbell explained each view as it was thrown on the screen, pointing out the different kinds of cells which make up the various parts of the plant. The lantern used was that recently purchased for the use of the Normal School and through the kindness of Dr. MacCabe, was placed at the disposal of the club for this and other soirées.

The second soirée was held in the Assembly Hall of the Y. M. C. A. on December 12th. In the absence of Dr. Ami,

President of the Club, Prof. John Macoun occupied the chair and gave a short opening address in which he pointed out the educational value of natural history studies to young people. Mr. W. H. Harrington then read his paper on "Ottawa Diptera." He spoke of the different species of flies, mentioning those that were injurious to cereals, etc. He also referred to diseases, and to the habit of grocers placing fruits and berries on the sidewalks exposed to flies which only a moment before may have come from some decaying animal or vegetable matter.

Dr. James Fletcher, of the Experimental Farm, then gave a most interesting address on "The Rearing of Insects," and showed what great pleasure and profit might be obtained from watching an insect develop through all its stages. He also gave many valuable hints to beginners as to the details. Mr. Arthur Gibson, Mr. Fletcher's assistant, followed with a paper on "Some Interesting Moths Taken at Ottawa." All three papers were illustrated by suitable collections, and Master Louis Burland showed a box of minerals and fossils neatly labelled. An interesting discussion followed, in which a number in the audience took part, and further information was elicited by questions.

The thirdsoirée, was held in the Assembly Hall of the Y. M. C. A. There was a good attendance of members and strangers. Zoology, Ornithology and Geology formed the topics of the evening.

Prof. E. E. Prince, B.A., F.L.S., gave a most interesting paper "On the Comparative Anatomy of the Ear," in which he traced the unity of structure and arrangement in that organ from the lowest organism up to the highest and the special adaptation of that box or mechanical contrivance to receive vibrations and impart them to the nerves connected therewith. By means of a beautiful series of coloured and exquisitely prepared and original slides thrown upon the screen, Prof. Prince illustrated the anatomy of the "true ear" in jelly fishes, worms, mollusks, birds, fishes, reptiles and vertebrates. An interesting discussion followed this paper in which Messrs. Kingston, Whyte, Evans and the lecturer took part.

Mr. Andrew Halkett, of the Marine and Fisheries Department, then read his paper "On Gannets and Cormorants, with Special Reference to Canadian Forms." This paper was full of interesting notes of observations made in the field and along the shores of the Atlantic and Pacific in British North America.

(1) "*Note on the Occurrence of Ranopleurides in the Upper Trenton (Ordovician) of Parliament Hill, Ottawa, Canada*"; (2) "*On a new species of Turrilepas from the Trenton limestone of Governor's Bay, Ottawa, Canada,*" are the titles of two brief papers presented by Mr. H. Ami, in which he give descriptions of two species supposed to be new to science. The first was a trilobite from the Upper half of the limestone beds of Parliament Hill, Ottawa, whose affinities came close to *Ranopleurides Canadensis*, Billings, described from the Chazy of the Township of Clarence, some 500 feet lower down in the series of Ordovician strata in the Ottawa Valley.

The other was a 'barnacle' or cirripede from Governor's Bay, of which one of the small opercular valves was discovered on on the occasion of one of the Club's Excursions last April, 1899. Its nearest ally is *Turrilepas Canadensis*, Woodward, from the Utica of Gloucester, opposite the Old Rifle Range. Mr. Ami then drew the Club's attention to Prof. W. H. Hobb's interesting paper "On the Diamond-field of the Great Lakes" and gave an abstract of its contents, illustrating his remarks on the discovery of the eight diamonds in Wisconsin, Ohio and Michigan glacial gravels by means of lantern slides in which the probable source of the glacial drift of three states was traced to Canada from the detritus brought down by the Labradorean or Keewatin glaciers or both.

"*Principal Places of Geological Interest about Ottawa*" was then discussed by the President and illustrated by means of lantern slides. Dr. Fletcher, Messrs. A. W. Brock, R. B. Whyte and others took part in the discussion which followed the reading of these geological papers.

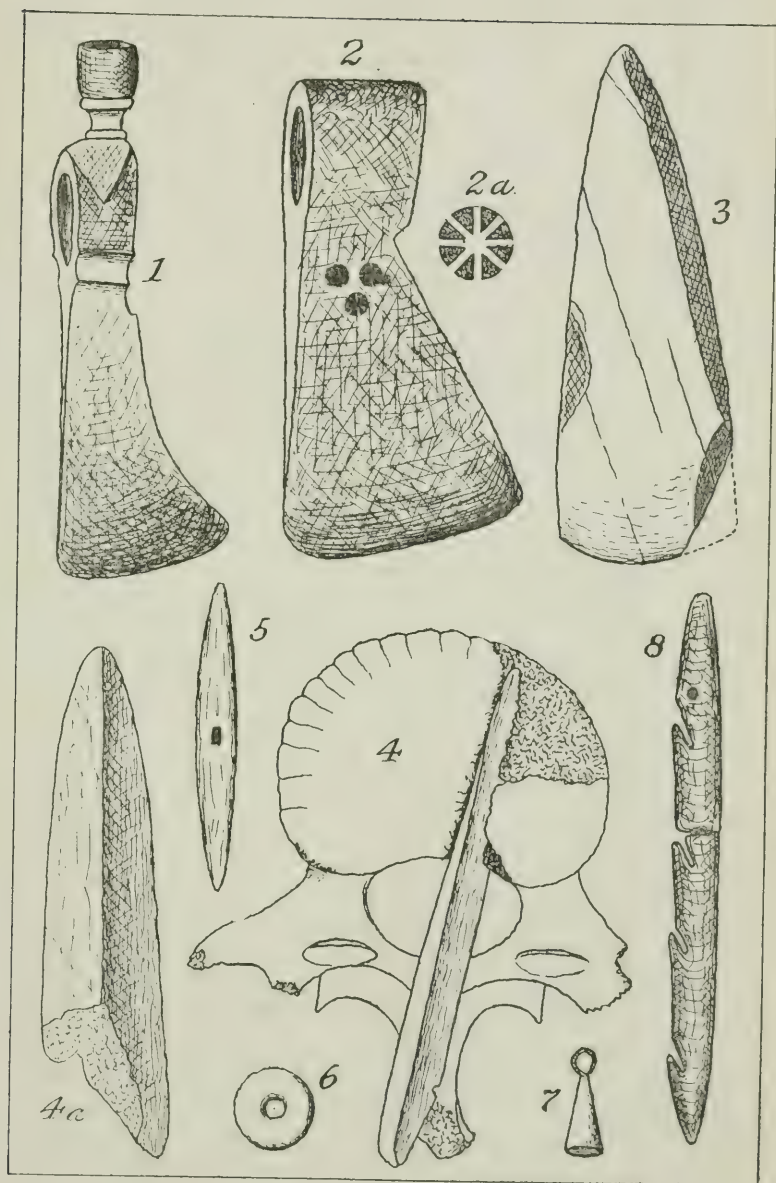
NOTES.

In a review of a paper by Prof. T. R. Jones and Dr. Henry Woodward on *Belinurus grandævus*, a new species of Palæozoic Limuloid Crustacean from the "Eo-Carboniferous" of Riversdale, N.S., it is stated on page 208 of this journal that *Belinurus* has not been found in rocks of earlier age than the Coal Measures. In Geikie's Text Book of Geology, however, this genus is mentioned as occurring with *Pterygotus*, *Bothriolepis*, *Coccosteus*, *Pterichthys*, *Glyptolepis* and other typical Lower Devonian and Silurian forms in the Kiltorcan beds of Ireland. Thus the inference drawn in the conclusion of this article that these rocks are Carboniferous does not seem to be sustained. May it not on the other hand be assumed that "The faunæ of the seas of the Lower Carboniferous, Coal formation and Permian periods, both in Europe and America, present so great similarities that they may, in a broad view of the subject, be regarded as identical;" * while for "Lower Carboniferous," according to correlations of the fossils from these strata in New Brunswick and Nova Scotia made recently by Professor Kidston and Dr. David White, as recorded by Mr. J. F. Whiteaves in his "Address on the Devonian System in Canada," must we now say "Lower Devonian"?

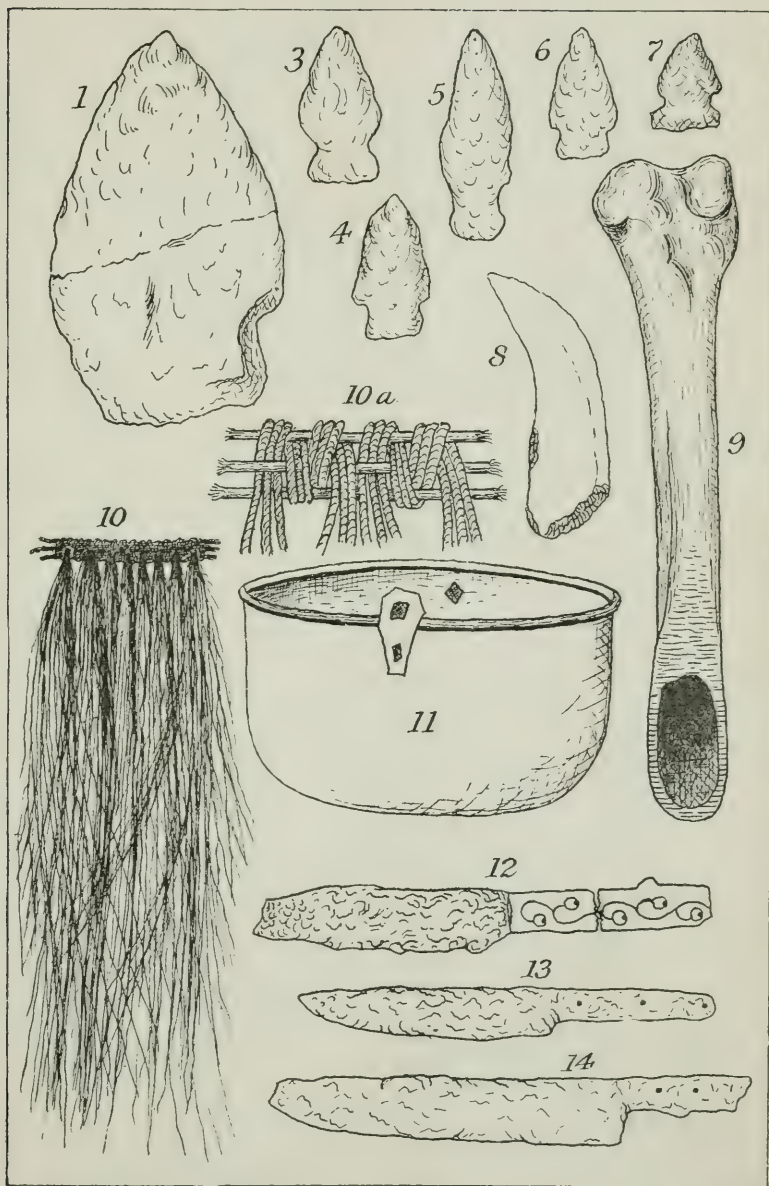
R. W. E.

Mr. Sinclair, M.A., Vice-Principal of the Normal School, has been granted leave of absence for one year. He expects to spend most of the year at Chicago University where he has recently been awarded an honorary post graduate fellowship in the Department of Pedagogy. The fellowships of which there are only two granted by the University are given in recognition of original Educational research. He also expects to spend several months observing European schools. During his six years stay in Ottawa he has been librarian of the O. F. N. C.

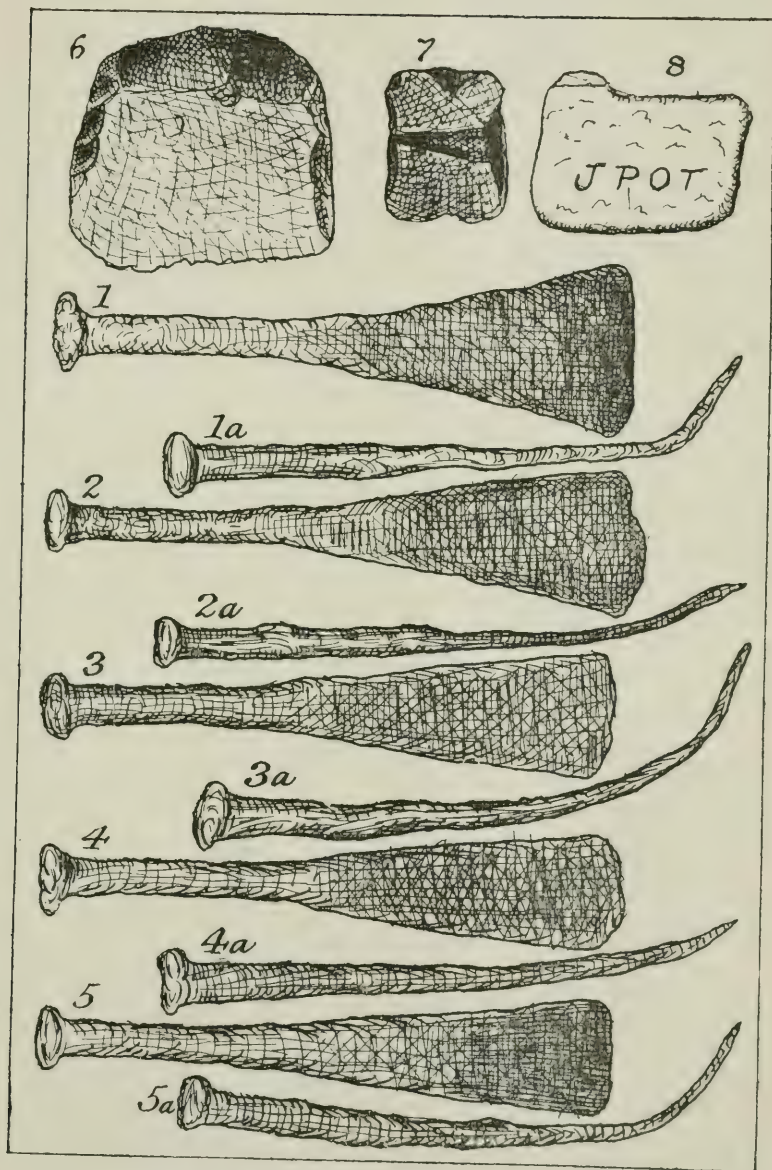
* Acadian Geology, page 283.



To illustrate Mr. T. W. E. Sowter's paper, "On the Archæology of Lake Deschênes, Aylmer, Que."



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RANGIFER DAWSONI.

PRELIMINARY DESCRIPTION OF A NEW CARIBOU FROM QUEEN CHARLOTTE'S ISLANDS.

— . —
BY ERNEST SETON-THOMPSON.

In August, 1899, while at Ottawa, Canada, my attention was called by Dr. G. M. Dawson, of the Geological Survey, to the fact that Caribou exist on the northernmost and largest island of the Queen Charlotte group, and later, on my asking for fuller details, he wrote me as follows :

“ When engaged in geologically surveying the Queen Charlotte Islands in the summer of 1878, I heard of this animal but did not see it, and from Indian accounts came to the conclusion it was the Wapiti, which as you know occurs on Vancouver Island. In my report for 1878-79, p. 113 B, I therefore referred to it as follows : ‘ There is pretty good evidence to show that the Wapiti occurs on the northern part of Graham, but it is very seldom killed. The small Deer (*C. columbianus*) is not found on the islands, nor is the Wolf, Grizzly Bear, Mountain Sheep or Mountain Goat.’

“ At a later date I ascertained that the animal in question was not the Wapiti but the Caribou, from Mr. Charles, formerly connected with the Hudson's Bay Co. in Victoria. He had a skin of the animal, imperfect, but with horns and hoofs sufficient to show its general character.

“ The only published reference I have made to the occurrence, that I can remember, is in a paper on the Later Physiographical Geology of the Rocky Mountain Region in Canada. Trans. Royal

Society of Canada, Vol. VIII, Section IV, 1890, pp. 51-52. This is as follows :

“One further circumstance may, in conclusion, be referred to here as being readily and intelligibly explicable on the hypothesis of a considerable elevation of the land at about this time, (close of the glacial period.) This is the existence at the present day of Caribou in the northern part of Queen Charlotte Islands.

“In a former report on these islands I have spoken of the occurrence of the Elk or Wapiti on them. This statement was, however, based merely on Indian report, as none of the animals in question were seen. Since that time I have learned from Mr. W. Charles, that the animal in question is really the Caribou, and I have been shown by him the skin and antlers of one of these animals. The Caribou is not now found anywhere else in the region of the coast, either on the islands or on the Coast Ranges, though it roams over high plateaux to the east of these ranges. The shortest distance between any point of the Queen Charlotte Islands and the nearest islands of the Coast Archipelago is thirty miles, and the intervening strait is subject to rapid tidal currents. The isolation of the Queen Charlotte Islands is in fact so complete that the Deer, which inhabits all the other islands of the coast, is not found in this group.

“It is, therefore, in the absence of the Caribou from the neighboring coast and its adjacent islands, and in consideration of the width of the waterway which would have to be crossed, at least highly probable that this animal reached the Queen Charlotte Islands under the present conditions. I am thus led to believe that the Caribou colonized the islands at a time at which either the glaciers extending from the mainland attained to the Queen Charlotte Islands, or by a land connection during a period of greater elevation.* The latter is in every way the more probable supposition, and, if it be entertained, it may further be assumed that the animal came to the islands at the date of the immediately post-glacial elevation above indicated, and that it has since, as an isolated colony, succeeded in maintaining itself there.

* This minimum amount of elevation required would be about 200 feet above the present level,

"The Indians of the Queen Charlotte Islands have evidently long employed the antlers of the native Caribou for the manufacture of various implements, clubs, etc., as some of the oldest of these in our collections are of that material, which was evidently prized. These Indians are not great hunters and in fact dislike going into the interior of this island and on the higher ground where the small bands of Caribou occur.

"You will notice from my remarks above quoted that these animals must in all probability have been a long time entirely separated from any others, and I should think it highly probable with an animal so variable as the Caribou that they may have developed considerable peculiarities."

A fortnight later I was in Victoria, Vancouver Id., and had an interview with Mr. W. Charles, at his home on Fort St. Mr. Charles was Hudson Bay Co.'s factor at Victoria for years, and the Queen Charlotte Islands came within his official district. He informed me that while visiting at Masset in the north end of Graham Island, he several times heard reports that Caribou were found on the island. But the Indians never brought any in, for they have a superstitious dread of the interior and of the west coast, where the Caribou are found. They believe that if they go there they will be devoured by some fabulous monster that comes up from the sea. At best they are poor hunters, and rarely think about the chase when they can get a meal of fish. One day in 1882 (?) when Mr. Charles went as far as the west slope of the mountains on the Pacific side he noticed a great extent of beautiful level upland pastures, and remarked that if there are any Caribou on this island this is the place to look for them. Accordingly Mr. Alex. Mackenzie, an ex-employee of the Hudson's Bay Co., set out with some Siwash Indians and found near the place a large herd of Caribou, and opened fire on them. The first to fall had only one horn. They brought its skin and skull to Mr. Charles, who states that the skin was of a mouse colour and the animal too small for the Woodland Caribou, and too dark to be the arctic species. He is of the opinion that it is closely related to the Barren Ground Caribou. The skin was destroyed, but the fragmentary skull with its one horn was deposited in the Provincial Museum of Victoria, B.C.

Dr. Dawson has called my attention to the following passage in Mackenzie's "Notes on Certain Implements and Weapons of Graham Island. (Trans. Roy. Soc. Canada, Sec. II, 1891, p. 50.

"*Reindeer antler Tomahawk* (Haida, *Scoots-hlth-at-low.*) [No. 1302]—This very ancient and interesting relic is made from one of a species of Reindeer which inhabits the mountainous interior of Graham Island. In ancient times these Reindeer were hunted by the Haida and killed by bow and arrow, being highly prized both for meat and skin. [See Marchand's Voyage, Chap. V, 1791.] This weapon was the property of the Masset doctor, or medicine man, who is still alive but aged. To him it was bequeathed by his predecessor who died many years ago. It is undoubtedly a relic of the times before these natives had intercourse with white men."

Through the courtesy of Mr. John Fannin I have had the opportunity of making a thorough examination of the skull in question and am convinced that the animal is entitled to formal recognition. I propose therefore to name it in honour of Dr. G. M. Dawson of the Canadian Geological Survey, the eminent explorer of the Queen Charlotte Islands, who first called the attention of the scientific world to the existence of the animal.

RANGIFER DAWSONI, *Sp. nov.*

Sp. character.—Its small size, about that of *Rangifer arcticus*, and its color, which is darker than that of *arcticus*, but much lighter than that of *montanus* from the interior of British Columbia.

Habitat.—Queen Charlotte Islands. The type being from the interior of Graham, which is the northmost large island of the group.

The nearest point on the mainland where Caribou are found is 150 miles away in the interior of British Columbia.

This individual was peculiar in having but one horn, but this is merely an accident and is probably the reason that the specimen was brought in by the hunters.

The following measurements will be of use in conjunction with the figures :

In figure 1, the length of the antler from below the burr following the outer curve to the top of the highest point, $28\frac{3}{4}$ inches

(730 mm.); girth of antler at base above the burr, $4\frac{3}{4}$ inches (120 mm.).

In figures 2, length from the point of the occiput A to the posterior point of the nasal bones B, $6\frac{9}{16}$ inches (166 mm.); greatest width across the orbits C. D. 6 inches, (153 mm.).

My thanks are due to Dr. J. A. Allen, of the American Museum, for the opportunity to compare its skull with that of its giant relative *Rangifer montanus*.

DESCRIPTION OF A NEW SPECIES OF CALCAREOUS SPONGE FROM VANCOUVER ISLAND, B.C.

BY LAWRENCE M. LAMBE, F. G. S.

LEUCANDRA TAYLORI. (*Sp. nov.*)

Sponge small, solitary, sessile, nearly spherical, terminating above in a well developed oscular fringe. Surface hispid, owing to the presence of projecting, stout oxea. The three specimens representing this species are of about the same size and shape, the one figured (figs. *a* and *b*) measuring 4.5 mm. in breadth and about 6 mm. in height, including the oscular fringe, which has a length of a little over 1 mm.

The walls of the sponge are thick and the gastral cavity is cylindrical and narrow, being slightly less than 1 mm. in width. The inhalent pores are scattered on the dermal surface and the flagellated chambers (*f c*, fig. *c*) are small, averaging about .06 mm. in width, rounded and disposed irregularly in the wall. The exhalent canals leading into the gastral cavity have not been satisfactorily seen.

Skeleton.—The skeleton consists of triradiate spicules of the parenchyma, of gastral triradiate, of dermal triradiate and large oxeote spicules, of slender, linear, dermal spicules and slender oxeote spicules of the oscular fringe.

1. *Triradiate spicules of the parenchyma*.—Slightly sagittal; the basal ray straight, up to about .117 mm. long, the

lateral rays generally slightly curved, about .091 mm. long; the three rays tapering to a point and about .009 mm. in diameter at midlength; oral angle slightly smaller than the other two. Thickly scattered irregularly in the wall (figs. *c* and *d*).

2. *Gastral triradiates*.—Similar to the triradiates of the parenchyma except that the basal ray reaches a length of .209 mm., the lateral rays a length of .157 mm. and all the rays are about .006 mm. in diameter at midlength. Lying parallel to the gastral surface (figs. *c* and *e*).
3. *Dermal triradiates*.—Slightly sagittal with equal angles, the basal ray reaching a length of .072 mm., and the lateral rays a length of .045 mm.; all the rays are rounded at their extremities and measure .004 mm. in diameter; an aborted fourth ray is sometimes apparently developed. Occurring in three or four layers parallel to the dermal surface (figs. *c* and *f*).
4. *Large oxea*.—Varying in length from .616 to 1.096 mm. and in diameter at midlength from .041 to .068 mm.; slightly curved, the curvature being most pronounced near their outer ends; at right angles to, and with generally about one-third of their length projecting beyond, the dermal surface. Some of the smaller spicules of this kind are entirely embedded in the wall or protude but a little beyond the surface (figs. *c*, *g* and *h*).
5. *Minute linear spicules*.—Very slender, about .131 mm. long and .002 mm. in diameter. Numerous and lying irregularly, with the dermal triradiates, parallel to the outer surface (figs. *c* and *i*).
6. *Oxea of the oscular fringe*.—Slender, about 2.5 mm. long and .09 mm. in diameter, forming a well developed fringe around the osculum.

Three specimens of this sponge were collected by the Rev. George W. Taylor, of Nanaimo, B.C., who found them adhering to the under side of boulders, between tides, at Boat Harbour, six miles south of Nanaimo, on the 24th of June, 1899. Mr. Taylor has also sent to the writer two small sponges that on examination

prove to belong to the species *Sycon protectum*, Lambe, described originally from a specimen dredged by Mr. J. F. Whiteaves in 1872 eight miles south-east of Bonaventure Island, Baie des Chaleurs (*vide* Transactions Royal Society of Canada, second series, Vol. II, 1896). The specimens of this second species were found also at Boat Harbour growing on the under surface of boulders between tides.

Figure *c* of the plate accompanying the above description represents part of a horizontal section of the sponge.

ANNUAL ADDRESS OF THE PRESIDENT OF THE
OTTAWA FIELD-NATURALISTS' CLUB, H. M. AMI,
M.A., F.G.S., DELIVERED NOVEMBER 28TH, 1899.

In four brief months our Club will have attained its majority, and it may not be considered out of place to look backward for a moment and cast a cursory glance over that period of time which has elapsed since the Club was organized in 1879.

The special object which the Club had at its inception, of investigating the natural history resources of the district about Ottawa, was constantly kept in view, and I think no one can deny that the Club has prospered and accomplished a considerable amount of work in the direction of so worthy an object.

The Ottawa Field-Naturalists' Club now counts within its membership a large proportion of the active and working naturalists of Canada, which constitute a small army of observers in the field of Nature. The three original members of the Club, Dr. James Fletcher, Mr. W. H. Harrington and Mr. R. B. Whyte, who were the leading spirits in formulating the character as well as the aims of the Club at its beginning, are still with us, and as active as ever.

Previous to 1879, the Ottawa district had received a certain amount of attention at the hands of the late Mr. E. Billings, the late Dr. VanCortland, and of Dr., now Sir James Grant. The first obtained a large amount of geological material, especially from the Trenton formation so well developed in our neighbour-

hood, which enabled him to publish those excellent Decades, or Descriptions of Canadian Organic Remains, and give to the world much information respecting the ancient life of those early seas which once covered this portion of the North American continent.

Outside of this but little systematic work had been published or recorded from this locality until the Club made its appearance, and sought to develop and search out the geological, botanical, entomological and other resources at our very doors. In the department of Entomology, and through the writings of Dr. Fletcher, of Mr. Harrington and of Mr. T. J. McLaughlin, the Transactions of The Ottawa Field-Naturalists' Club, in the first six parts, and in THE OTTAWA NATURALIST, which followed, contain probably more information regarding the insect life of our district than can be found recorded for any other city in Canada. In the department of Botany the good work of Dr. Fletcher, in his early edition of the *Flora Ottawaënsis*, which served to guide many of us in the pleasant paths of flowering plants, with his enthusiastic co-worker, Mr. R. B. Whyte, in the opening year of our Club, gave an impetus to the study of plants which was only enhanced by the advent of Prof. John Macoun, M.A., F.L.S., and his family to our city. In Ottawa, the active, genial and militant professor was made welcome, and he has given the Club the constant benefit of his wide experience, urged everyone to more objective work and greater effort in carrying out the objects of our Club. "What are you doing for the Club, or for natural history?" was the constant question put. It is a notable fact that the botanical branch of our Club has been ever the most popular. The second edition of the *Flora Ottawaënsis*, in which Dr. Fletcher gives the precise locality in which each species can be found, besides its name, common and scientific, proved a further boon to botanical students. A careful use of this work and dilligent search after the rarer specimens of plants about Ottawa, invariably led those devoting their attention to this fascinating branch to discover their prize and complete their herbaria.

Whether on the mountain top or in the valley, or again by the riverside or along the brooks or lakes of our district, in the swamps and rocky places, in the diversified regions such as we

fortunately possess about Ottawa, in shady as well as in sunlit spots of the district, there are a thousand and one gems of beauty in plant life awaiting the keen observer in a delightful as well as healthful pursuit.

Turning our attention to the field of Geology in the Ottawa district, a year has not passed since the Club was organized but some discovery was made of some species or form unknown to science, or in the tracing more exactly the trend of the various geological formations which we have. The important work done by the late E. Billings, and of the Geological Survey in the fifties, served as a basis for operation, and a systematic table of the geological formations about Ottawa together with their characters, their fossils, the thickness of the strata, and other interesting notes, giving a very comprehensive and concise history of the district in pre-human times, is now available for reference. Details in stratigraphy have been recorded, and rare specimens of fossils discovered during the excursions of the Club, many of which have proved of considerable value to the Geological Survey department, have been recorded in the Transactions of the Ottawa Field-Naturalists' Club. Information thus obtained by our members, who happened to be members of the Geological Survey staff, has enabled the latter to describe with greater degree of accuracy various geological features of the Capital besides other portions of Eastern Ontario, which have come within the sphere of the Club's activity. In the field of Geology there is yet much to be done. In the Archæan formations alone, which are so well and extensively developed to the north of our city, and from which mica, apatite, graphite, asbestos and iron, as well as other minerals of economic value to men are obtained, there is a wide sphere of research open to the geologist. More especially in the sub-division of Petrography, or that science which deals with the microscopical character and structure as well as the origin of the rocks, is the field extensive and important as well as interesting. We shall not understand the proper relations of the various members of that great Archæan complex until a careful study has been made of the numerous and varied rock masses which are the oldest that we know in the earth's crust, and which supplied the materials from which all the subsequent and

newer deposits were derived. In this field alone there is work for a dozen members of the Club, for a whole lifetime each, without exhausting the subject. There is no better field in North America.

Ever since the formation of the Club, the subject of Conchology, or the study of shells, has engaged the attention of some of the members of the Club. Mr. Gilbert C. Heron, Dr. James Fletcher, Mr. W. H. Harrington, Mr. J. F. Whiteaves, Hon. Mr. Porier and lastly and conspicuously, Mr., now the Hon. F. R. Latchford, have contributed valuable papers regarding the various species of land and fresh-water shells of the Ottawa district, and recorded such notes of observations and descriptions of species as will enable any amateur, or other collector of shells, coming within this district, to ascertain definitely what species may be found, and will enable also outsiders to see in what manner satisfactory results may be obtained and information derived bearing on the shells of whatever district in which they may be residing.

In Ornithology, Messrs. W. L. Scott, W. A. D. Lees, A. G. Kingston, Miss Harmer, Miss Ballantyne, Messrs. G. R. and T. Whyte, and the Messrs. Saunders have contributed valuable notes to the literature of the Club, whilst in Zoology proper, Mr. H. B. Small, Mr. W. P. Lett, Mr. J. B. Tyrrell, Prof. Prince, Mr. Odell, and Prof. Macoun have all given us a fair idea of the fauna of the Ottawa district and elsewhere. In the department of chemistry many important papers and contributions of special interest to the Ottawa public and Canadian investigators, have appeared from time to time from the pens of Mr. F. T. Shutt, Dr. R. F. Ruttan and others.

In the field of Archæology, the Club has of late had a new field of research open, and one full of promise. For a number of years past it has been known that the Ottawa Valley was the home of many tribes of aborigines, who left behind them in the sites of their abandoned villages rude implements of the chase and of war, relics of a bygone civilization which have only just begun to be investigated. For years past, an intermittent stream of specimens has come to the notice of the Ethnological division of the Geological Survey from various points in the Ottawa Valley, and in Mr. Sowter's paper "On the Archæology of Lake Deschênes,"

read before this Club last winter, we have what I believe will form the first of a series of most interesting papers describing the early history of Man in this district long after the close of the Glacial period and subsequent to the Champlain period of submergence, which is followed by that in which we now live, the "Recent" period of elevation.

In all these branches of the Club's work there has been marked activity in the field. To this may be added the reports of the leaders of the branches, which form, and ever ought to form, an important feature in the Club's work, for in them suggestions for work to be done as well as to avenues open appear from time to time in order to stimulate work.

For a number of years the main object of this Club was the study of this locality alone, but with the growth of our city, and the addition of a considerable number of scientific men on the staff of the various departments of the Government service, as well as with a considerable influx of members from other parts of the Dominion who desired to join us, and who contributed papers upon the natural history of the districts in which they happened to reside, our Club was of necessity compelled, in 1890, to widen its sphere of activity, so that, to-day, besides investigating and reporting upon the natural history and geology of the Ottawa district (which it is understood comprises an area with a radius of twenty miles, with Ottawa as a centre) also publishes reports and papers bearing upon the natural history and geology of other parts of the Dominion of Canada.

Ottawa is no doubt fast becoming one of the leading centres of scientific research on this continent, and outside of the technical and professional reports, issued by authority of Parliament, there ought to be a most active and live organ or medium of publication in our midst, worthy of our Capital. Freedom in the discussion of the various scientific problems that occur in the study of any field of natural history or geological inquiry, as well as encouragement in the search for additional light upon these problems, with facility for publication, ought to be the share of every investigator. Such encouragement to research must necessarily help in developing our material resources, which must form a potent factor in building up our nation.

Our medium of publication, THE OTTAWA NATURALIST, which constitutes and includes the Transactions of the Ottawa Field-Naturalists' Club, has been regularly published since 1880. In its 13 volumes there are more than 2000 pages of text, and there may be found stores of information bearing upon local natural history, in which the economic as well as the scientific side of the subject is recorded. It is not my purpose to shower encomiums or praise on the workers of the Club for what they have accomplished. The pleasure and interest as well as the health and exercise derived from such researches are sufficient remuneration for whatever toil, trouble and drudgery they may have experienced. To develop the powers of observation and comparison in man there is no better occupation. It is excellent training for the mind as well as the body.

One feature of the Club's work to which I need scarcely draw your attention is in connection with the educational institutions of the city. It is very gratifying to the executive of the Ottawa Field-Naturalists' Club to have our meetings and excursions prove of interest to those engaged in training the mind. We are pleased also to have the good-will of the worthy principal of the Normal School—Dr. MacCabe—who has always been a friend of the Club. It is one of the ambitions of the Club to assist in a measure not only to awaken a live interest in natural history researches, but also to build up a reference collection of specimens illustrating the recent as well as extinct faunas and floras in the Ottawa district, so that the students of botany, entomology, conchology and geology, as well as ethnology can have access to it for the sake of comparison.

We are pleased to see that already a number of collections have been donated by various members of the Club to form the nucleus of such a useful series. The best thanks of the Club are due to Dr. MacCabe for the use of this fine Assembly Hall for three evenings of the course of winter soirées.

TRIBUTE TO THE LATE E. BILLINGS.

It was my purpose at one time to give you this evening a short paper on the more important localities where the most interesting geological phenomena may be studied to advantage about

Ottawa. Such a paper seems necessary at this juncture, but I will postpone this to a later date, and if you will bear with me for a few moments I desire to introduce a subject which long before this ought to have received attention at our hands. I refer to the life and works of the late Elkanah Billings, the great Canadian palæontologist, who founded the Canadian Naturalist and Geologist, was elected Fellow of the Geological Society of London and of numerous other societies, and assisted Sir William Logan in laying the foundation of our knowledge of the geology of the older provinces of Canada. Billings was a citizen of this city, and in a suitable manner such a society as ours ought to do something towards perpetuating his memory.

As one who for the last twenty years has come in almost daily contact with the works and writings of the late Mr. Billings, I cannot refrain from giving utterance to the statement that it is impossible not to see in him one of the greatest men that Canada has produced. It is further owing to Billings that some one should undertake to give to the world a complete and systematic list of the various genera and species of fossil organic remains which he described, in a compact form, and likewise to place together in their chronological order his numerous and important writings. These various lists, which comprise some fifty-eight new genera and as many as 1,051 new species of fossil organisms, besides a list of his writings, I have undertaken to prepare, and now beg to submit to you for publication. I shall not trouble you by reading these over, but would supplement these remarks by throwing out a suggestion which I humbly ask you to consider. Is it not our duty as well as our privilege, as a Club organized to look after the interests of science and scientific research, to see that a suitable memorial or tribute to the memory of such an illustrious Canadian as Billings ought to be erected in our midst? Two suggestions have occurred to my mind, and both appear feasible and appropriate. These are:—1. By means of a portrait or oil painting of the late E. Billings; 2, the erection of a memorial tablet to be placed in some conspicuous locality on the strata of our Capital.

With regard to the former, I may say that when the subject was first mooted, some months ago, a number of gentlemen in-

terested in geology in Canada volunteered to subscribe toward obtaining a portrait of Mr. Billings. An excellent painting of him is now in the Museum of the Natural History Society of Montreal.

Inasmuch as Billings not only developed a taste for and carried on researches in Geology and Palæontology in Ottawa, it seems particularly appropriate for some such institution or society as our Club to undertake the task of raising a small fund towards perpetuating his memory in our midst, and I now desire to present the case to your mind, with the subscription list open for your kind and generous consideration, to which list a number of names are already attached.

With regard to the second suggestion made, of erecting a memorial tablet and placing it in some conspicuous position in our city, this seems to meet the approval also of a number of persons to whom the subject has been broached. A similar memorial tablet has been erected and placed in a conspicuous outcrop of one of the geological formations of Prague, in Bohemia, in honour of the late Joachim Barrande, the great palæontologist of Central Europe who himself in his lifetime was in communication with Mr. Billings, whom we are seeking to honour for the marvellously large amount of most excellent work which he performed, not only in Canada as a whole, but more especially in Ottawa.

I shall not attempt to give you a biographical notice of the late Mr. Billings, inasmuch as there exist already a number of fairly complete notices of his life history. It will suffice to offer for publication in our Transactions such records of his writings and works which in our opinion are greatly needed by all working palæontologists, and which in our humble judgment ought long ago to have been prepared.

THE LATE SIR WILLIAM DAWSON.

I would be remiss of my duty as president of a Club like ours if I did not refer to the loss which science in Canada has so recently sustained in the person of one who during his entire career has taken a most active part in the progress and advancement of geological research in our country. I refer to the late principal of McGill University, Sir William Dawson.

His life was one of unremitting toil in the interests of education, science and religion. Sir William Dawson accomplished

enough in each of these three classes of work to satisfy any three hard-working individuals! He leaves behind him such monuments of industry and perseverance as few men do. The Peter Redpath Museum of McGill University alone is a monument which for ages will give food for thought to the coming generations both of students in the University and to the geologists who seek to unravel the problems of geological science in different portions of Canada, but more especially with reference to those of the Maritime Provinces, his native land.

Sir William was born in the town of Pictou, Nova Scotia, on October 13th, 1820, and just as the first hour of the day of rest dawned last Sunday, November 10th, 1899, he departed to his long rest. He has done more to stimulate and encourage the study of the natural sciences, and especially of geology, in Canada than any other individual. His vast store of knowledge, acquired by diligent labour in the broad field of nature as well as in the laboratory, embraced several of the leading sciences, and at one time, owing to circumstances in connection with the University over which he presided for a period of forty years so successfully, his courses of lectures included chemistry, botany, zoology, together with geology, palæontology and mineralogy.

As a palæo-botanist, Sir William's reputation was world-wide, and his descriptions of the fossil floras of Canada from the earliest Palæozoic, through the Carboniferous on to the Mesozoic and later Tertiaries, to those of more recent times are too well known to be dwelt upon on this occasion.

No less than seventy-nine distinct papers or articles upon fossil plants have been published by him, and amongst these are included descriptions of the fossil flora found in the Leda-clay formation of the Ottawa Valley. As a student of recent plants he did much to stimulate activity and build up the magnificent herbarium now existing at McGill. His "Acadian Geology," in which are described the succession of the geological formations of Nova Scotia, New Brunswick and Prince Edward Island, as well as their mineral resources, is a most fascinating work. In it he describes not only the various organic remains peculiar to the Atlantic Provinces, but enters into unusually interesting discussions regarding the origin of coal, the climatic and other condi-

tions which characterized the formations which were laid down with the coal. To these are appended notes of ethnological value regarding the Micmac language, and other notes of interest.

In the land animals of the Coal Period, Sir William Dawson discovered much that was new to science, and opened up this subject in a masterly way, and it has since expanded to a marked degree. His descriptions of the Microsauria which he found buried in the basal portions of the fossil trees, along the famous Joggins section of Cumberland County, Nova Scotia, will ever remain as one of his most conspicuous and important writings. In them he has reconstructed an extinct fauna of quadrupeds which inhabited the shores and shallows of the Eastern Atlantic coast, and of the estuaries and lagoons of the great Coal period, besides describing shells and insects of those lakes and bays—all air-breathing types of intense interest—the first of many races that were to follow in the chain of geological times and develop to higher forms in subsequent times. His numerous writings upon "*Eozoön Canadense*"—the "Dawn of Life" organism—have perhaps more than any others tended to make his name famous in the field of Science. In periodicals and magazines on both sides of the Atlantic, Sir William contributed a great number of papers and articles bearing upon the origin of the masses of laminated rock found in the Laurentian rocks of Canada which Sir William Logan, Dr. T. Sterry Hunt, Dr. W. B. Carpenter, Prof. Murie and many microscopists, naturalists and geologists held to be of organic origin.

Sir William was highly systematic in all the work he undertook. His was a busy life, but he was always calm, and met even the humblest child with courtly grace, generous spirit and dignity, commanding the respect and admiration of all who knew him.

The McGill of to-day is the result of his arduous labours in connection with that educational centre. He had the peculiar faculty of enlisting support and co-operation on the part of those with whom he came into contact.

As a writer, who sought to present in a popular form the results of geological science to a larger audience than greeted him on the college benches, he was eminently successful. Such works as the "Meeting Place of Geology and History," "The

Story of the Earth and Man," "Facts and Fancies in Modern Science," "Fossil Men and their Modern Representatives," "Salient Points in the Science of the Earth," "Modern Ideas of Evolution," are some of the more interesting, of his popular works. The many editions through which these various writings passed, testify to their popularity on both sides of the Atlantic. Throughout the English-speaking world his name was a household word, and a letter of introduction from him was a passport in every country in Europe.

As a Bible expositor, Sir William stood high. He ploughed deep in the books of Holy Writ, and subjected those writings to the same keen critical sense to which he referred other problems in the scientific world, and brought out many hidden truths from the Word of God which had been hitherto obscure. "Egypt and the Holy Land; their Geology and Natural Resources," "Eden Lost and Won," "Archaia," "The Mosaic Cosmogony," "Modern Science in Bible Lands," "The Origin of the World According to Revelation and Science," form part of a series of writings of an apologetic character, which in his day Sir William Dawson deemed necessary to combat certain views which were thrust upon the more or less observant and thinking world regarding the origin of man, as well as of other species living upon this planet. These have no doubt played a conspicuous part in establishing the present more or less evident equilibrium which exists in the think-world regarding the relations which exist between our beliefs in religion as well as in science. They are two distinct spheres, and our earnest endeavours ought to be directed towards the perfection of our knowledge in one direction as well as in the other, in order to satisfy these two sides at least of our nature.

Between four and five hundred titles of papers bearing directly on the Geology and Palæontology of Canada and other countries have been gathered together, and it is my purpose to append to this brief sketch of the life-work and history of one of Canada's greatest sons as complete a catalogue of his writings as possible in chronological order.

His first work was published in Edinburgh, Scotland, in 1841, while yet a student at the university, and the last of his writings is yet unpublished.

His was a well-spent life, unselfish in all its aims and purpose, unsparing in his efforts to advance the interests of his fellow citizens and of humanity in general, exercising withal a power and influence for the moral good and welfare of all in a high degree. Of him it might be truly said what Socrates once said of a well-spent life, "For noble is the prize and the hope is great."

And to those of us who have had the privilege to listen to his marvellous flow of language, his lucid descriptive power, as well as those of us who have sat under him, may it be said that we have caught something of the fire and earnestness of his life and spirit which helped to complete his noble life. And when we see the many results achieved during this useful life, to those who ask, we say, "*Si quæris monumentum, circumspice.*"

THE NATIONAL MUSEUM.

Another point which such a Club as ours is in duty bound to notice, is the erection in our midst of a National Museum. As a citizen of Ottawa, the Capital of our great Dominion, if not as an officer or simple member of this Club, I desire this evening to unite our voices and sentiments with those expressed at the opening meeting of the Canadian Institute.

Mr. Byron E. Walker, F.G.S., President of that Institute, and Manager of the Bank of Commerce, condemned in very strong terms the inadequate outlay upon the Geological Survey of this country, and the condition of the Museum. "We will stand disgraced," he said, "until we bestir ourselves, and show that we possess intelligence in this matter. At least \$250,000 should be appropriated annually by the Dominion for our Geological and Natural History Survey, whilst each of the Provinces should in addition grant \$10,000 for the same purpose. The Dominion Government at Ottawa and each of the Provincial Legislatures should have museums belonging to the people. The housing of the present collection at Ottawa in an unsafe building is a crime."

Apart from what you may consider professional reasons in making such a statement regarding the Museum, as a Canadian, as one who has at heart the development of our vast mineral as well as forestry and fishery resources—which represent Canada's best and most valuable commercial asset, our need of a National Museum, of a fireproof building, sufficiently large to house pro-

perly not only the present collection, which is exhibited in the old building on Sussex street, but also the thousands of specimens which are either stored away out of sight, or which it is impossible to exhibit in so limited a space at our disposal, but a building large enough to meet the exigencies of a growing time, is very deeply felt.

It is gratifying to see the noble effort put forth by the junior member of parliament for Ottawa, who takes such an active part in forwarding this good cause. We heartily wish him success and hope that the coming session of the Dominion Parliament will not close without voting a sum of money with which to begin the erection of such a monument.

CONCLUSION.

And now a word, in closing, about the work of our Club at Ottawa. There is a vast amount of work to do in any one branch in which the Club is engaged at present. It is earnestly hoped that the endeavours which are being put forth by this Club to stimulate and encourage the study of botany, geology, entomology and other sciences in our midst, will be appreciated by the Ottawa public, who are invited to attend the present course of lectures. Copies of the programme of this course of free soirées are here for distribution.

The membership of the Club, though fairly large, is not one-half what it ought to be in a city like Ottawa with a population of nearly 60,000 souls. It is gratifying, however, to notice a constant addition to our membership at each of the meetings of your council.

Without desiring to encroach upon the report of work done since the last annual meeting, it is particularly encouraging to observe that the seven Monday afternoon lectures, held in the Normal School building during the months of April and May, were very largely attended, as also the excursions and sub-excursions of the Club in the early part of the year. Let us all remember that the leaders of the various branches of the Club's work, as well as the editor and his staff of associates, are ever willing to give all the assistance they can to anyone desiring either to enlist in the army of the students of Nature or to contribute articles for our official organ, *THE OTTAWA NATURALIST*.

This is the first opportunity which I have had as your presiding officer to thank you for the honour you have done me in placing me in the chair. I make this statement being fully aware of my incompetency and mistakes, but depending upon you all for co-operation and good-will in carrying on in our midst the good work of my predecessors. Coming after such a series of illustrious men as Dr. James Fletcher, Dr. R. W. Ells, Dr. G. M. Dawson, Mr. F. T. Shutt, and Prof. E. E. Prince, not to go back any farther, I feel that the task assigned to me as well as the honour bestowed upon me, might have fallen upon much worthier shoulders. It shall be my utmost endeavour during the remainder of my term of office to promote the interests of this Club in all its branches.

We are not allowed to know very much in this world. Life is intensely short. The world of Nature around us contains myriads of attractive objects from which the highest lessons can be learned and our minds improved. Let us try, then, in some measure, to acquire some accurate idea of something in our vicinity.

Fig. 1.

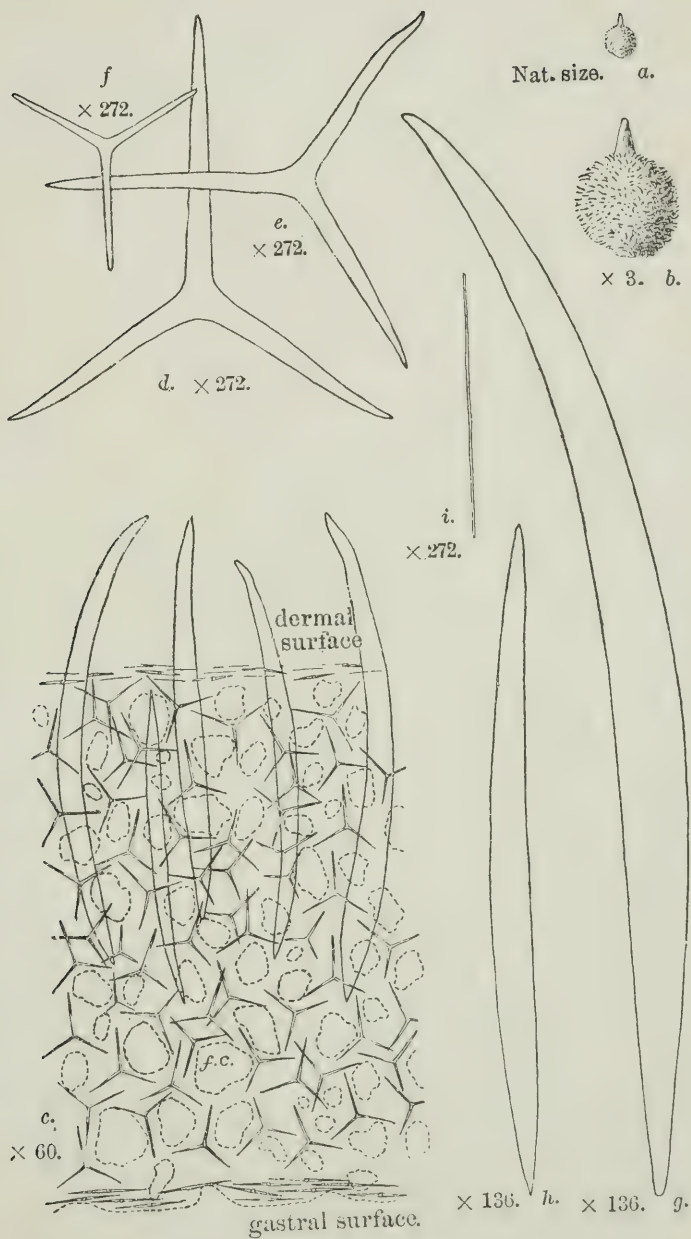


Fig. 3.



Fig. 2.





L. M. LAMBE, DEL.

LEUCANDRA TAYLORI.

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NOTES ON HUDSON BAY SPONGES.

BY LAWRENCE M. LAMBE, F. G. S.

The number of species of recent marine sponges known to occur in the waters of Hudson Bay and Strait is, up to the present, only four in number, viz., taking them in the order in which they have been collected, *Phakellia ventilabrum*, Johnston, *Reniera mollis*, Lambe, *Suberites montalbidus*, Carter and *Craniella cranium*, (Müller).

The specimens representing these species are in the collection of the Geological Survey.

Two specimens of *Phakellia ventilabrum* were obtained by Dr. Robert Bell, of the Geological Survey, in 1880, one at York Factory, the other between York Factory and Fort Severn, and later, in 1896, Mr. A. P. Low, of the Geological Survey, collected another specimen of the same species on the east coast of Hudson Bay, near Great Whale River. This species has been recorded in North American waters from the North Pacific Ocean, Behring Sea and the Arctic Ocean in the west, and from the River and Gulf of St. Lawrence, and the north-east coast of the United States in the east, (vide Transactions, Royal Society of Canada, vol. xii, 1894, and second series, vol. ii, 1896).

The second species is represented by a fragmentary specimen dredged by Mr. Low in 1897, in Wakeham Bay, Hudson Strait, in 10 fathoms, mud bottom. *Reniera mollis*, like *P. ventilabrum*, has been found on both the Pacific and Atlantic coasts of the continent, in Elk Bay, Discovery Passage, Vancouver Island, B. C., and off the coast of Labrador and at the entrance to the Baie des Chaleurs (vide Transactions, Royal Society of Canada, vol. xi, 1893, and second series, vol. ii, 1896).

One specimen of each of the remaining species *Suberites montalbidus* and *Craniella cranium* was dredged by Mr. Low in June, 1899, in Richmond Gulf, Hudson Bay, in from 15 to 30 fathoms, soft mud bottom.

Suberites montalbidus has a wide northern distribution and it is not surprising to find it in Hudson Bay. Its range includes Behring Sea and Strait, Beaufort Sea, the Siberian Arctic Ocean, the Kara Sea, the European Arctic Ocean, Barent's Sea, and the sea west from Greenland (vide Transactions, Royal Society of Canada, vol. xii, 1894). The Hudson Bay specimen is irregularly pear-shaped, higher than broad, broader above than below where it has apparently been attached to some hard object; height 6 cent., greatest breadth a little over 4 cent., colour in alcohol a dark grayish brown, surface rough (except on the top, where it is comparatively smooth), covered with small, irregular elevations separated from each other by a net-work of wrinkles or furrows. A single osculum, about 8 mm. in width, occupies the centre of the summit, and in the sides are numerous small openings, having a maximum width of about 1 mm., which are probably the entrances of inhalent canals. The sponge is soft and yielding to the touch and probably the roughness of the surface is exaggerated by shrinkage. The spicules agree in size and shape with those of the specimen from Unalaska Island, referred to by the writer in volume xii of the Royal Society's Transactions.

Craniella cranium is also well known from North Atlantic waters generally and Fristedt in his "Sponges from the Atlantic and Arctic Oceans and the Behring Sea" mentions three specimens obtained off the east and west coasts of Greenland. Mr. Low's specimen is somewhat ovate in shape, broadly rounded above and prolonged downward below where the basal strands have the appearance of having been attached to some foreign object; total height 10 cent., maximum breadth 4.5 cent., surface uneven, monticulate. The extreme summit is abraded. The measurements of the spicules agree with those given by Sollas in his description of the species (vide Report Tetractinellida, Challenger Expedition vol. xxv). A point of some interest is that the spicules of *Craniella Logani*, Dawson, from the Leda clay at Ottawa and Montreal, are practically identical in shape and size with those of Mr. Low's

specimen. The spicular similarity between the Leda clay sponge and *Craniella cranium* has already been pointed out by the writer, (vide Transactions. Royal Society of Canada, second series, vol. ii, 1896). Mr. Whiteaves has recognized amongst the shells dredged by Mr. Low with this sponge, some of the species considered typical of the Leda clay in eastern Canada, notably—*Pecten Grænländicus*, Sowerby, *Modiolaria discors*, L., *Portlandia glacialis*, (Wood), *Nucula tenuis*, M ntagu, *Macoma sabulosa*, Spengler (*calcarca*, auct.) and *Saxicava arctica*, L. Judging from this we evidently have in Hudson Bay a deposit, in course of formation, that has a fauna to a large extent the same as that revealed to us by the Pleistocene fossils of the Leda clay.

APPENDIX TO PRESIDENT'S ADDRESS DELIVERED BEFORE THE OTTAWA FIELD-NATURALISTS' CLUB.

SIR JOHN WILLIAM DAWSON has contributed so many papers, volumes and articles to Science, Education and Literature in general that it will be some time before a complete list of his writings can be produced.

I have attempted, in this issue of THE NATURALIST, to submit as complete a list of Sir William's writings as I have been able to gather to date. It forms part of my presidential address, delivered November 28th, 1899, before the Ottawa Field-Naturalists' Club, and especially to that portion (pp. 270—274) referring to the life and works of Sir William Dawson.

I desire to acknowledge with thanks valuable assistance received from Dr. G. M. Dawson; the Librarian of the Parliament of Canada, Mr. Martin J. Griffin; the Librarian of the Peter Redpath Library of McGill College, Montreal, Mr. C. H. Gould; Mr. Scott, Librarian of Princeton University, Princeton, New Jersey; Prof. D. P. Penhallow; Sir John Bourinot, Hon. Sec. of the Royal Society of Canada, Ottawa, and Prof. David White, of the Smithsonian Institution, Washington, D.C.

H. M. A.

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